TIPS • TOOLS • TECHNIQUES

# ShopNotes®

Vol. 6 Issue 34

## Bent Lamination

- Flush Trim Jig
- Fishing Net
- Table Saw Insert
- Ripping Thin Strips
- Bent Wood Serving Tray

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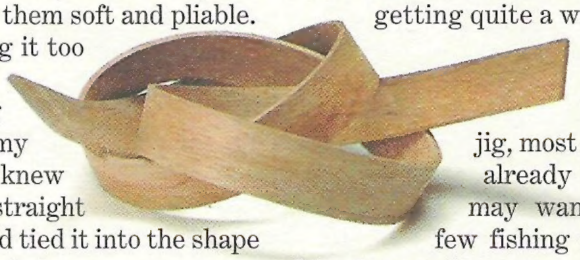
EDITOR'S NOTE

# Cutoffs

We have a big sink in our shop for cleaning up. And like you'd expect in a busy shop, sometimes things fall into it that don't really belong — like pieces of wood.

In fact, just the other day I noticed a few thin scraps of wood laying in water in the bottom of the sink. When I fished them out, I got a surprise. They weren't stiff and rigid. Instead, the water had made them soft and pliable.



Without giving it too much thought, I started twisting them around in my hands. Before I knew it, I had taken a straight piece of wood and tied it into the shape of a pretzel, see photo.

Cute trick. But what does it have to do with woodworking? Well, it got me thinking about making a project that uses the same basic idea — transforming a straight piece of wood into a graceful curved shape. It's called bent lamination.

**BENT LAMINATION.** This is a process that involves ripping a bunch of thin strips of wood. Then, after slathering glue on each one, bending and clamping the strips around a jig to create a curved wood form.

If this sounds messy (and a bit hectic), that's because it is. The slippery strips slide out of alignment as you bend them around the jig. Glue is oozing out everywhere. And the bending jig looks like a pin cushion bristling with clamps.

But when the glue dries and you remove the clamps, the reward is worth it — a graceful curved form made of wood.

**STEP-BY-STEP.** Like any woodworking technique, the secret to getting good results with bent lamination is to take things one step at a time. So we've included a separate article beginning on page 20 that should make the entire process go smoothly.

In addition, there are a couple of projects that will give you a chance to experiment with bent lamination.

**FISHING NET.** One project that has sparked quite a bit of interest around here is a fishing net, see page 24. In fact, the bending jig used to make the curved frame of the net has been getting quite a workout. Which brings up a point. Once you build the jig, most of the work is already done. So you may want to make a few fishing nets for your friends as well.

**SERVING TRAY.** Another bent lamination project that's a bit more challenging is the serving tray shown on page 6. That's because it incorporates another "wrinkle" into the bending process — how to make wood bend *and* twist at the same time to form a compound curve.

**THIN STRIPS.** In addition to these projects, we've also included an article on how to rip the thin strips you'll need to a consistent width, see page 15. And there's a "zero-clearance" insert for your table saw (page 12) that allows you to rip the strips safely and accurately.

**HELP WANTED.** We're looking for a full-time art director to help develop and produce our woodworking books. Ideally, this person should have considerable graphic design experience with special concern for details. Also, "how-to" book publishing experience would be a real plus.

If you're interested, please send a cover letter and resume to: B.A. Moore, August Home Publishing, 2200 Grand Ave., Des Moines, IA 50312.

Tim

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*Serving Tray* *page 6*

## Departments


### Readers' Tips ____ 4

*Our readers offer their own shop-tested tips for solving some of the most common woodworking problems.*

### Shop Solutions ____ 30

*These tips from the guys in our shop make it easy to get professional-looking results on the projects in this issue.*


## Tips & Techniques

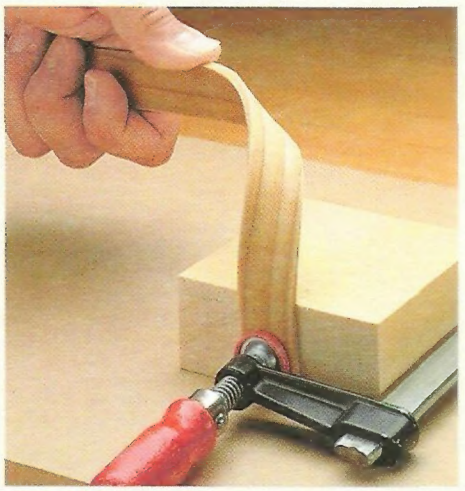

### Ripping Thin Strips ____ 15

*Two different methods for ripping thin strips of wood to a uniform thickness — just what you need to ensure success when making a bent lamination project.*

### Bent Lamination ____ 20

*What's the secret to bending wood into a graceful, flowing curve? It's the details. We show you how to "read" the grain of the wood strips used to make a bent lamination, design the bending jigs, and glue up the strips.*

*Flush Trim Jig* *page 16*



*Bent Lamination* *page 20*

## Projects


### Serving Tray ____ 6

*The curved sides and the bent wood handles of this serving tray are both made by gluing up thin strips of wood. But they provide two different bending challenges.*

### Table Saw Insert ____ 15

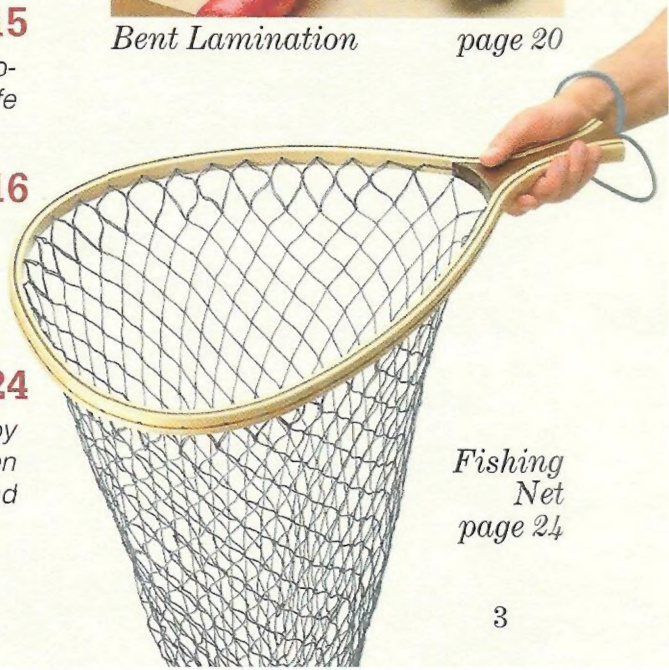
*This shop-made insert for your table saw has a "zero-clearance" opening for the blade that provides a safe way to rip thin strips. And it reduces chipout as well.*

### Flush Trim Jig ____ 16

*Trimming solid wood edging flush with the surface of a workpiece is easy with this flush trim jig. All you need is a hand-held router and a straight bit. There's also an optional edge guide for routing rabbets.*

### Fishing Net ____ 24

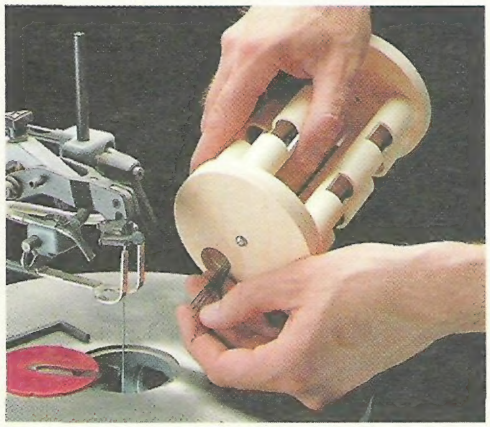
*The bent wood frame of this fishing net is accented by a walnut strip and handle that are sandwiched between four maple strips. Just string the net on the frame and head off to your favorite fishin' hole.*

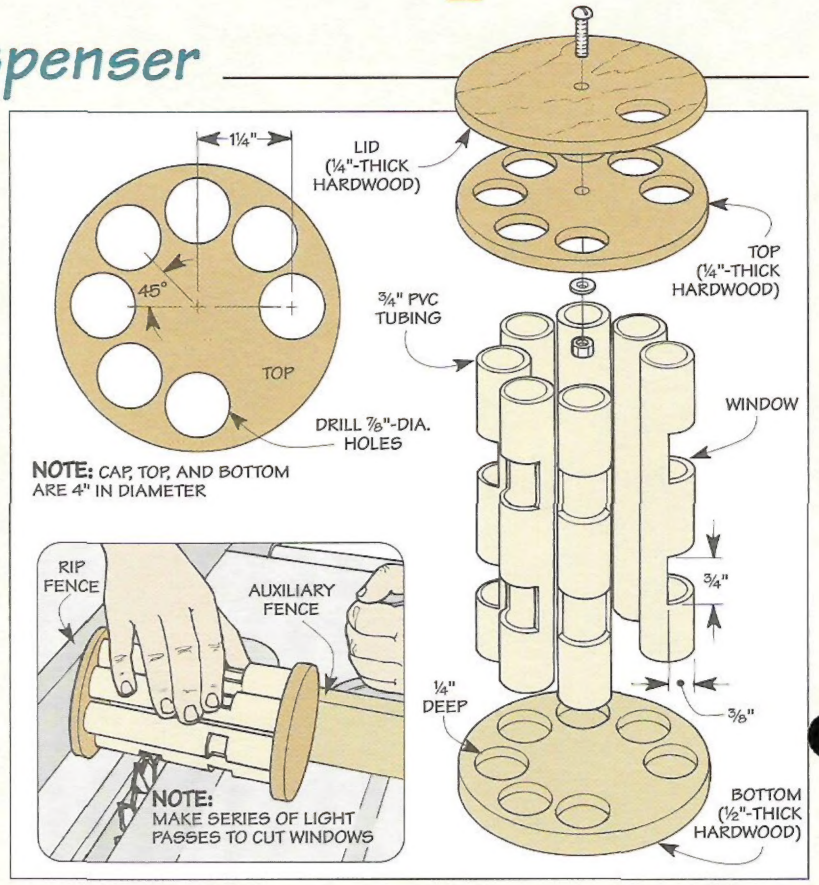



*Fishing Net* *page 24*

# Readers' Tips

## Saw Blade Dispenser






■ This simple dispenser is ideal for organizing small scroll saw blades and sabre saw blades. That's because the blades are "filed" in plastic tubes. To get the blade you need, just rotate a lid with a hole in it over the correct tube and shake the dispenser like a grated cheese shaker.

The tubes are pieces of PVC pipe that are captured between a disk-shaped *top* and *bottom*, see drawing. To keep the blades from falling out, the tubes fit in stopped holes in the bottom. And holes in the top keep the tubes aligned.

The holes are laid out around the perimeter of the disks. You'll want to leave one part of the disk "blank" though. By positioning the hole in the lid over the blank, you can close the dispenser.

After epoxying the tubes in the bottom, the top is simply press fit in place. Then I cut "windows" in each tube to see at a glance, the blade I need, see detail.

Now it's just a matter of adding the *lid*. It's held in place with a machine screw and lock nut.

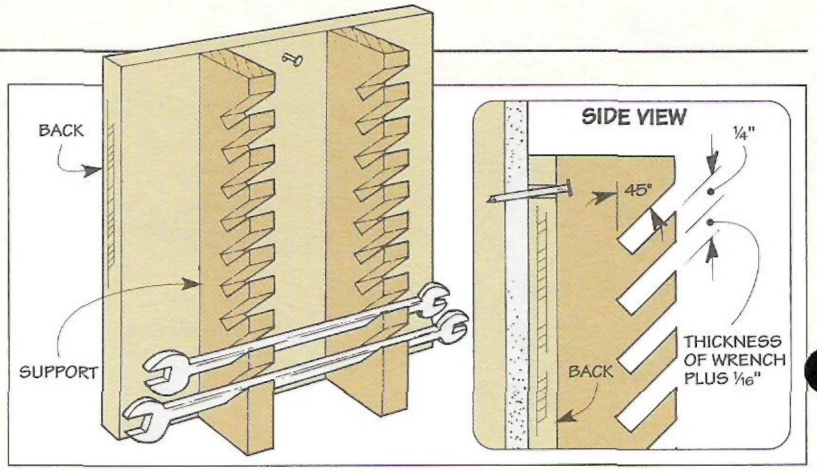
*Art Dimock*
*Barton, New York*

## Wrench Rack

■ Rather than toss my open-end wrenches in a toolbox (where they're a pain to dig out), I keep them right at hand on a wall-mounted rack.

The rack is just a plywood back with two hardwood supports. Angled slots in the supports allow one wrench to "nest" on top of another for compact storage.

*Sune Robins*
*Rancho Palos Verdes, CA*



# Quick Tips

▲ *To make crisp cuts in thin wood veneer,* ***David Callaway*** *of Tigard, Oregon uses a rotary fabric cutter and a straightedge.*

▲ *A "shield" cut from a milk jug keeps* ***John Polinski*** *of Boyn City, MI from marring his work when using a drill bit with a stop collar.*

▲ *These copper end caps are used by* ***Michael Burton*** *of Ogden, Utah to make sturdy ferrules for his tool handles.*

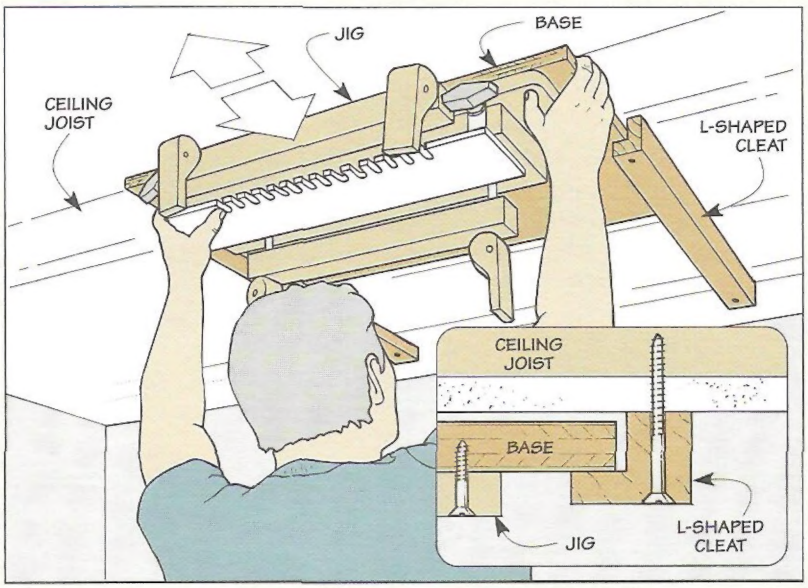
# Overhead Storage

■ Like many woodworkers, storage space on the walls of my shop is scarce. So I take advantage of the unused space overhead to store jigs that I only use occasionally (like my dovetail jig for example).

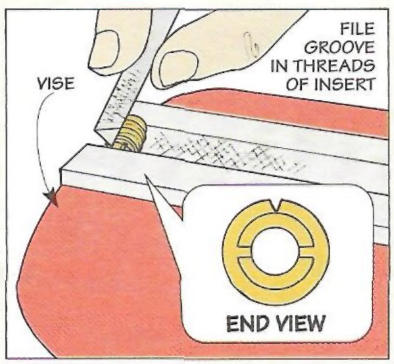
The jig is attached to an oversized plywood base that slides in and out of two L-shaped cleats. Each cleat is made from 1½"-thick hardwood and is screwed directly to two ceiling joists.

To store the jig, simply lift it overhead and slide the base into the cleats.

*Joseph Preston*
*Nassau, New York*




# Threaded Insert Tip




■ Nothing is more frustrating than installing a threaded insert only to have it split the wood.

So to reduce the chance of this happening, I file a V-shaped groove across the threads of the insert. This creates small teeth that cut quickly and easily into the wood.

*Douglas Lidster*
*Adel, Iowa*

## Send in Your Solutions

To share your original solutions to problems you've faced, send them to: *ShopNotes*, Attn.: Readers' Tips, 2200 Grand Avenue, Des Moines, IA 50312. (Or if it's easier, FAX them to us at: 515-282-6741.)

We'll pay up to $200 depending on the published length. Please include a daytime phone number so we can call you if we have any questions.

# Serving Tray

It's not the food that your friends will be asking about when you bring out this serving tray. It's the gently curved sides of the tray. And the handles that bend like the runners on an old-fashioned sleigh, see photo above.

So how *do* you bend the wood sides and handles in a graceful curve? It's not as complicated as you might think.

Start by gluing up thin, flexible strips of wood. Then bend and clamp the strips around a jig that holds them in the desired shape until the glue dries.

**TWO CURVES.** Since this serving tray has two distinct curved forms, it gives you a chance to experiment with two types of bending.

The sides of the tray form a *simple* curve as they wrap around the corners. But the handles present a bit more of a challenge. The thin strips that make up the handles are bent *and* twisted in a *compound* curve.

**MATERIALS.** But the bent wood forms aren't the only attractive thing about this serving tray. The sides are made of dark mahogany. So they produce a nice contrast with the light color of the maple plywood on the tray bottom.

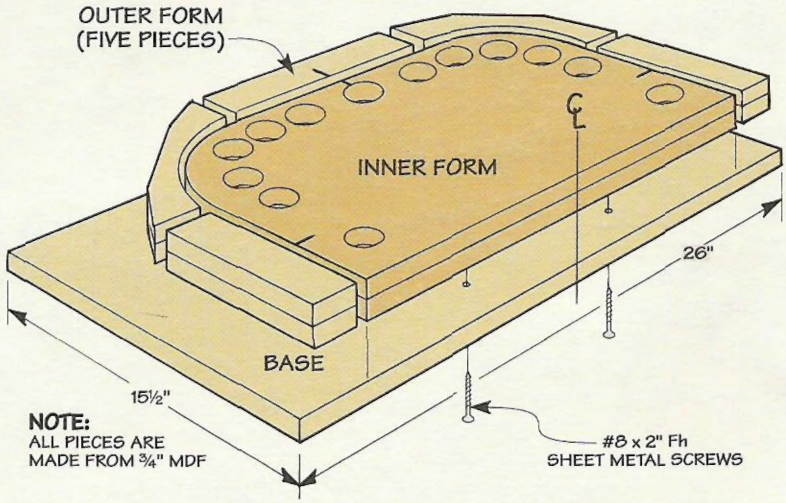
## Tray

Although the sides of the serving tray *appear* to be a single piece, they're actually *two* U-shaped pieces that wrap around a plywood bottom, see photo at right.

### BENDING JIG

Each piece is formed by wrapping thin wood strips around a bending jig. This jig consists of three parts: a base, an inner form, and an outer form, see drawing.

**BASE.** The base is a large platform that supports the inner and outer forms. And it prevents the inner form from sliding around as the strips are bent around it.



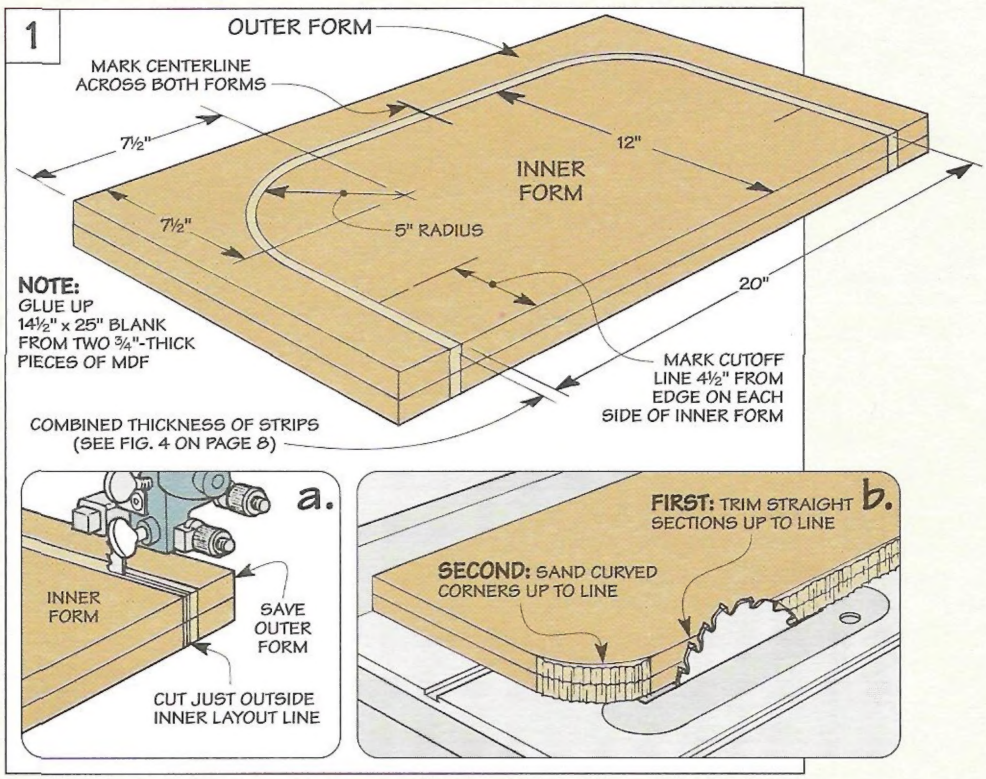
**INNER FORM.** After cutting the base to size, you can add the inner form. It establishes the basic shape of the sides. The inner form starts out as a large glued-up blank, see Fig. 1. Note: Both the inner and outer forms will be cut from the same blank.

**LAYOUT.** But first, you'll need to lay out the shape of the inner form, see Fig. 1. Once you establish this, it's a simple matter to define the curved, inside edge of the outer form. Just measure the combined thickness of the strips you'll be using for the sides and draw a second curved line that distance from the first, see Fig. 1 at right and Fig. 4 on page 8.

**REFERENCE LINES.** Before cutting the inner form to shape, it's best to draw a centerline which will make it easy to position the strips on the jig, see Fig. 1. And there are two cutoff marks to help lay out the final length of the side pieces.

**SHAPE FORM.** With the layout complete, you're ready to cut the form. Start by cutting just outside the first layout line, see Fig. 1a. Then clean up the straight edges on a table saw, and sand the curved corners up to the line, see Fig. 1b.

**CLAMP HOLES.** Next, to make pockets that let you "hook" the clamps onto the inner form, you'll need to drill holes around the perimeter, see Fig. 2. Then attach the inner form to the base with glue and screws, see page 6.



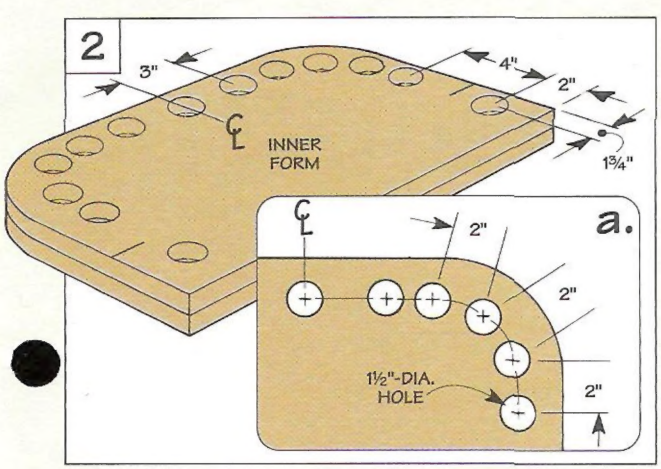

**OUTER FORM.** Now you can focus on the outer form. It consists of five pressure blocks that spread the clamping pressure evenly against the strips, see Fig. 3.

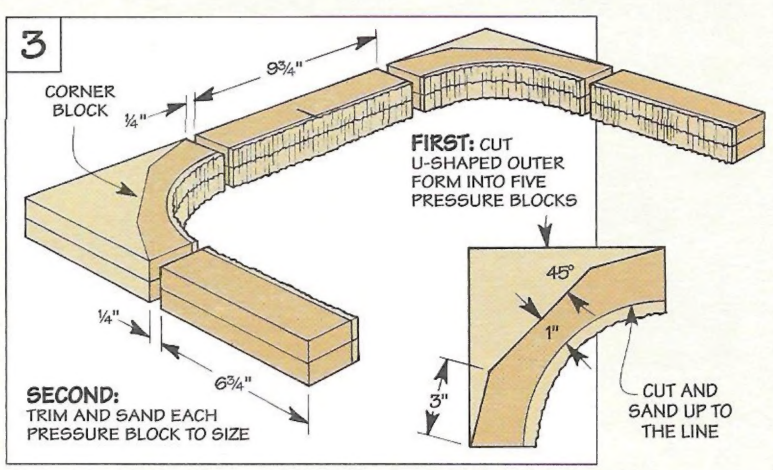
These pressure blocks are made from the U-shaped waste piece that was set aside earlier. To allow some adjustment which will help close up any gaps in the strips, the blocks are sized so there's a 1/4" gap between each one.

But the most important thing you can do to eliminate gaps is to make sure the inside edge of each pressure block fits tight against the strips. To accomplish this on the straight blocks, trim off the waste up to the line.

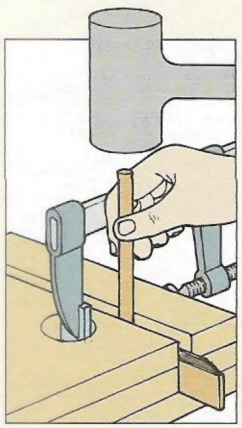
**CORNER BLOCKS.** As for the corner blocks, you'll need to sand a smooth curve on the inside edge. Then, to apply clamping pressure directly across the strips, the outside edges are cut at an angle.

**FINISH.** Finally, to keep the glue from sticking the parts of the jig together, I applied two coats of varnish and then waxed the form.



# Sides



*Use a dowel to gently tap the strips down against the base.*

Once the bending jig is waxed up, you can start bending the strips that form the sides.

**SOAK STRIPS.** Even though the strips are flexible, occasionally one breaks. So to make them even more pliable, I soak the strips in water for about thirty minutes and then "pre-bend" them, see Fig. 4.

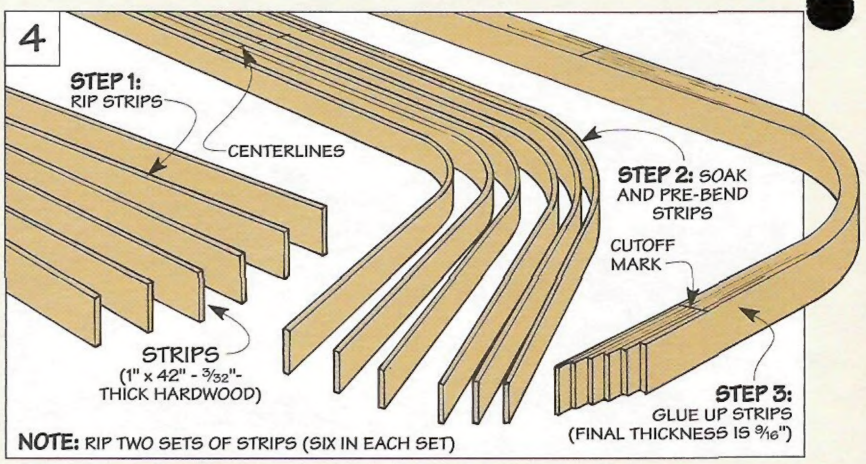
To do this, stack up the softened strips and place them on edge in the jig. Then slowly bend them around the inner form. Clamping the strips in place until they're dry builds in a "memory" of the bend. This way, they're less likely to break when you glue up the strips.

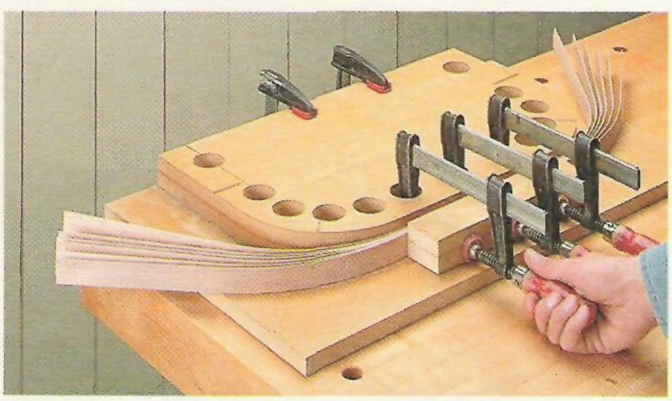
**GLUE-UP.** Even so, things can get a little hectic during glue-up. So I use hide glue to provide more working time. After applying glue on the outside face of each strip (except for the outer strip), bend them around the inner form and clamp the pressure blocks in place, see photos below.

**CUTOFF MARK.** Before removing the side from the jig, there's one more thing to do. That's to transfer the cutoff mark that indicates the length of the sides from the bending jig.

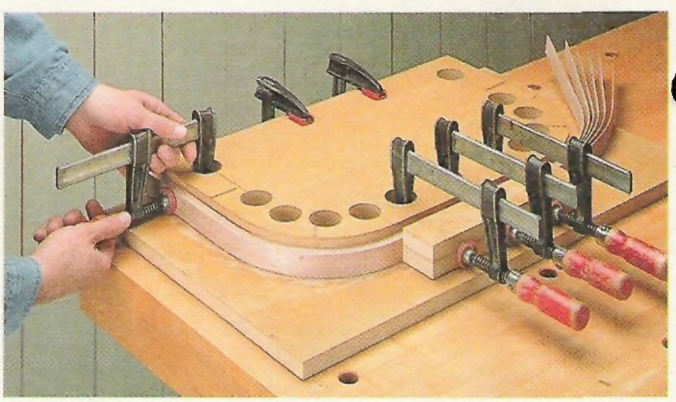
**CLEAN-UP.** When the glue dries, it's a simple matter of cleaning off the dried glue with a scraper and sanding the side smooth.

4



1 *Whether you're pre-bending the strips or gluing them together, start by centering the stack of strips on the inner form. Then clamp the center pressure block in place.*

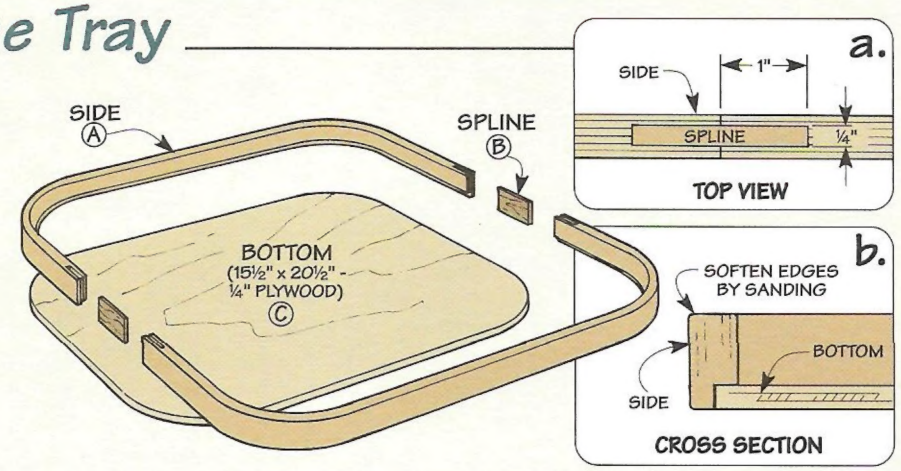


2 *Before adding the next pressure block, bend the strips the rest of the way around the form and "corral" the ends by positioning a clamp loosely around them.*

3 *Now clamp the corner pressure block against the strips. If the strips slide up, simply tap them back down against the base, see tip in margin.*

4 *After removing the clamp at the end of the form, you can add the last pressure block on the first side. Finally, repeat the process for the other side of the form.*

# Assembling the Tray




After the two sides are cleaned up, it's just a matter of joining them together with a hardwood spline and adding the bottom, see drawing at right.

**SQUARE ENDS.** To get a tight-fitting joint, you'll need to square the ends of each side. What worked well here is to use the table saw. To hold the side securely in place, it's clamped to an auxiliary fence that's screwed to the miter gauge, see Fig. 5. Then just trim the *side (A)* at the line marked earlier.

**KERF.** The next step is to cut a wide kerf in the end of each side to accept the spline. The only problem is this means you'll have to stand the side on end while you pass it over the saw blade. So in order to do this safely, I used a simple jig, refer to page 31.

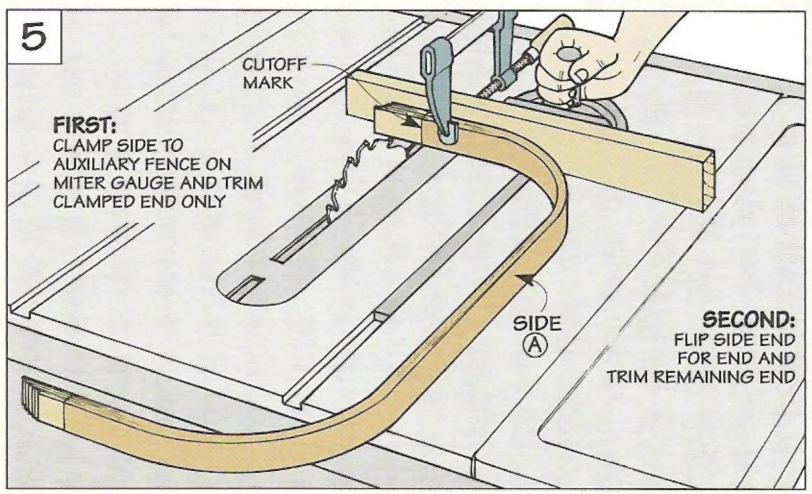
**SPLINES.** After cutting the kerfs, you can add the *splines (B)*, see Fig. 6. (I used mahogany to produce an almost invisible joint line.)

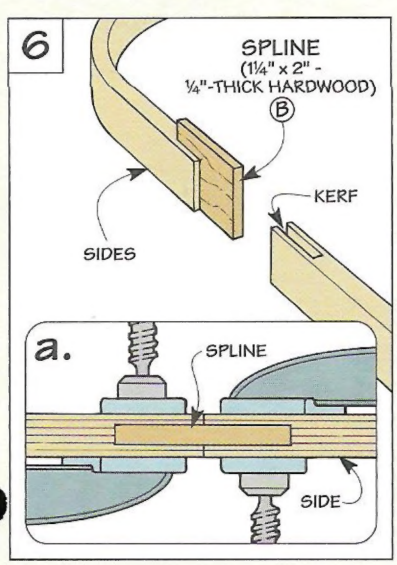
The splines are cut to fit snug in the kerfs. But they're a bit taller than the sides. (They're trimmed flush after they're glued in place.)

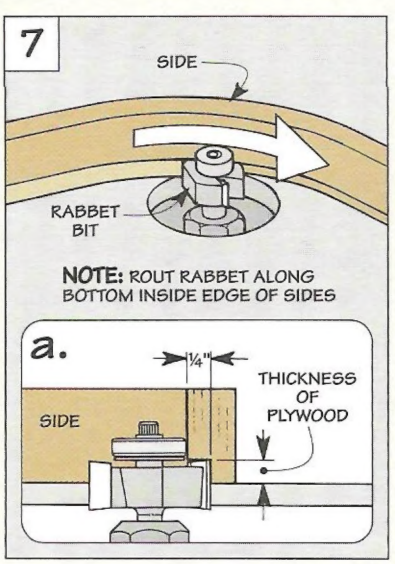
But gluing in the splines presents a small problem — there aren't any square corners to clamp across. So after applying glue to each spline and slipping them in place, I butted the ends of the sides together and clamped the joint tight, see Fig. 6a.

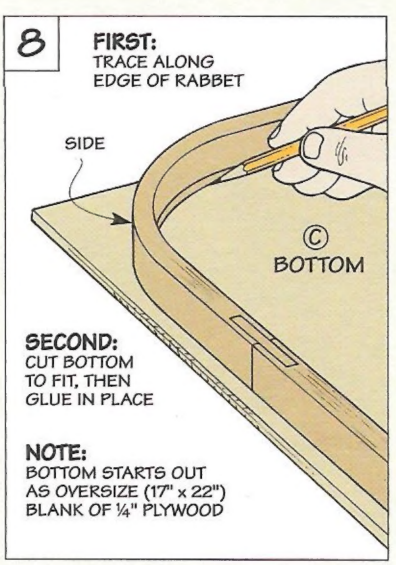
**BOTTOM.** All that's left is to add the *bottom (C)* of the tray. It fits in a rabbet that's routed in the bottom inside edge of the sides, see Figs. 7 and 7a.

To fit the bottom in the tray, trace along the inside edge of the rabbet, see Fig. 8. Then just cut the bottom to fit and glue it in.



# Handles

The most striking thing about this serving tray is the shape of the two handles. They wrap around the corners of the tray, then sweep under the sides like the handlebars on a 10-speed bike.

**TWIST.** To produce this shape, the wood strips that make up each handle aren't just bent — they're bent *and* twisted in a compound curve.

*A simple bicycle inner tube makes a strong, flexible clamp.*

## BENDING JIG

Bending wood in a compound curve is a bit more of a challenge. But ironically, it simplifies the bending jig.

**BASE.** Here again, the bending jig starts off as a base made from ¾" MDF, see drawing below. But that's where the similarity ends.

Because of the twist in the handle, there's no continuous surface to support the strips as they're bent. Instead, it uses three vertical supports.

**SUPPORTS.** A tall *upright* supports the center of the strips. And a pair of *support blocks* provide a clamping surface for the ends of the strips.

Although the supports work fine for the *straight* parts of the strips, you still need a way to squeeze the strips together as they bend and twist in the middle.

**INNER TUBE.** The solution is a bit unorthodox — an ordinary bicycle inner tube. The tube is cut in half lengthwise to provide two flexible "clamps" that wrap tightly around the bend like stripes on a candy cane, refer to Steps 3 and 4 on next page. Note: Two notches in the upright provide a starting point for the tubing.

**STOP.** One thing you'll notice as you bend the strips is the edges splay out of alignment. So to create a lip that aligns the edges near the bottom ends of the handles, there's a hardboard *stop* glued to each support block.

**ALIGNMENT BLOCK.** You'll also need an *alignment block*. It's nothing more than a scrap of wood with a rabbet that fits over the strips. When it's clamped in place, the block aligns the edges of the strips by pushing them against the stop. Just be sure that the block doesn't "bottom out" on the stop or the support block, see detail 'a.'

**ASSEMBLY.** Now you're ready to assemble the jig. This is just a matter of screwing the parts in place and adding hardwood *brackets* for rigidity, see detail 'b.'

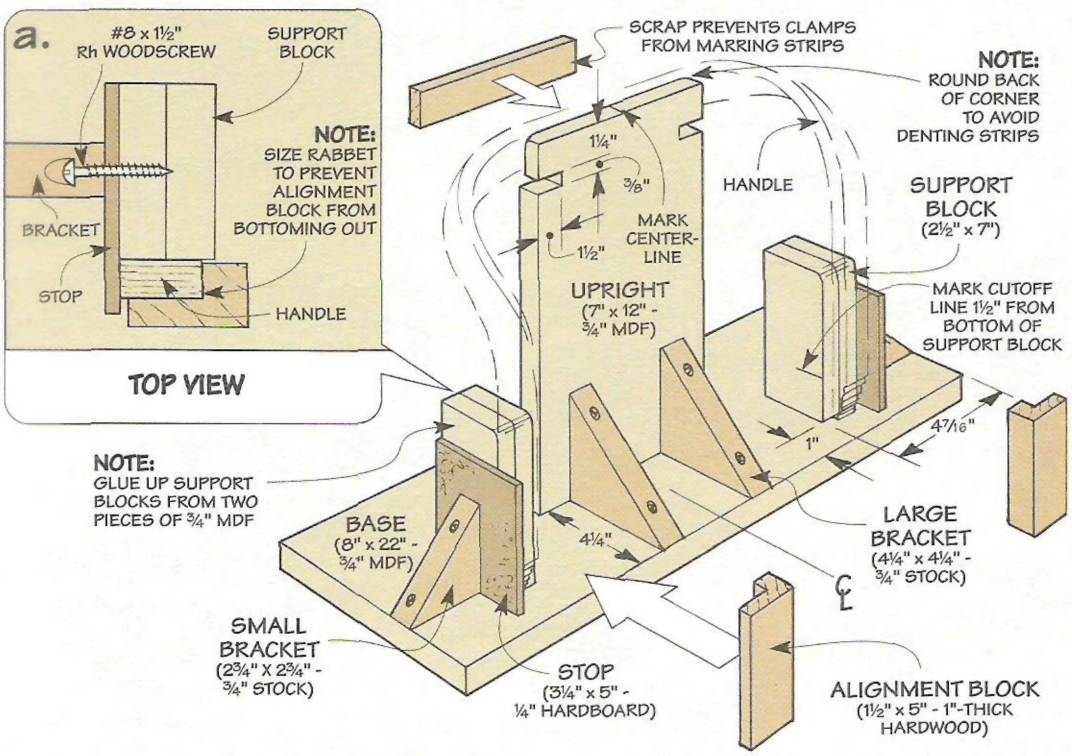
**REFERENCE LINES.** Here again, a centerline on the upright makes it easy to position the strips. And a cutoff mark on each support block ensures that the ends of the handle will be trimmed to the same length.

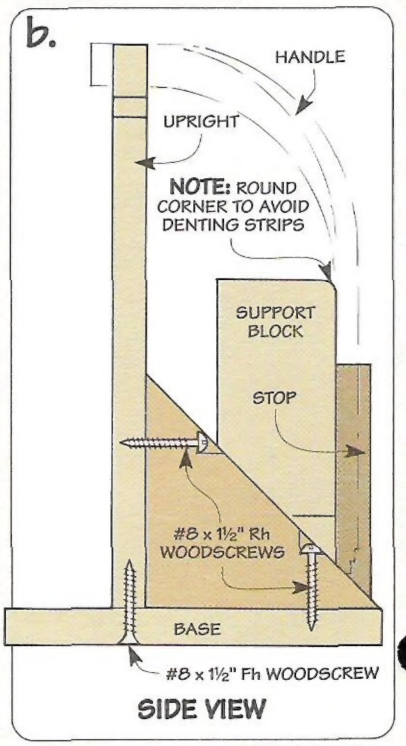
**FINISH.** Finally, I applied a couple of coats of varnish to the jig and waxed it as before.

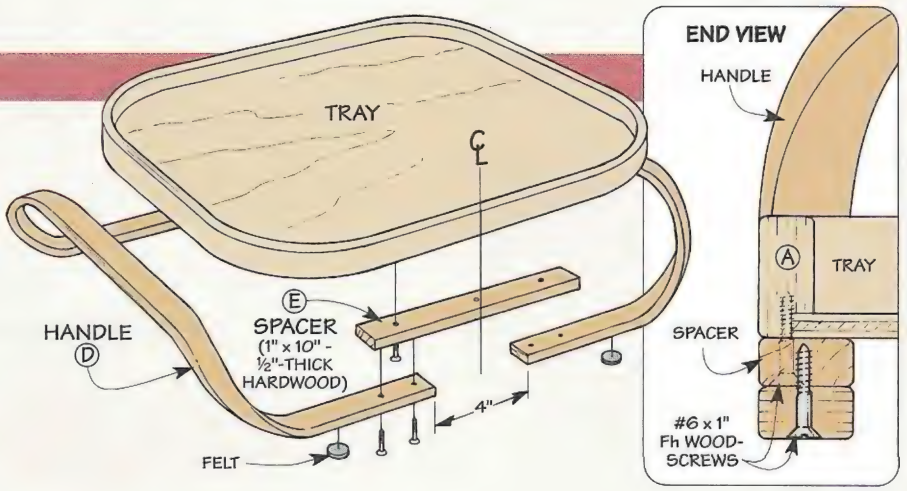
## BENDING THE STRIPS

Once the jig is complete, you're ready to start bending the strips that make up the handle.

As with the sides of the tray, you'll need two sets of strips (six in each set). Although the strips are the same thickness (3/32") and






width (1") as the strips for the sides, they're a bit shorter. (I cut the strips 38¼" long.)

**SOAK STRIPS.** Once again, I soaked the strips in water. But because the bend of the handles is a bit tighter, it's best to let them soak overnight. Then carefully bend and clamp the strips around the form until they're dry (about a day), see photos below.

**GLUE-UP.** After pre-bending the strips, it's just a matter of following the same process — only this time with glue. (I used hide glue here too.)

When the glue dries, don't forget to transfer the cutoff line from the jig to the handle. Then remove the *handle (D)*, trim the ends, and clean off the dried glue by scraping and sanding.

## ASSEMBLY

Now you're ready to assemble the serving tray.

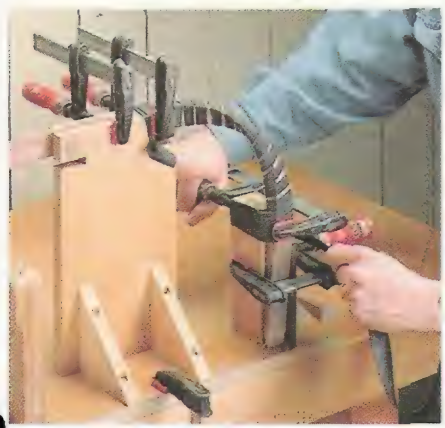
**SPACER.** The tray is raised above the handles with a hardwood *spacer (E)*, see drawing above. (I used mahogany.) This way, there's clearance between the curved corners of the sides and the bend in the handles.

To create a "shadow line," I softened the edges of the spacer before screwing it to the sides, see detail. Finally, just screw the handles to the spacer.

**1** *Start by centering the strips on the upright and clamping them in place so the edges align with the top.*

**2** *After carefully bending the strips down around the support block, capture the ends with a clamp.*

**3** *To anchor the tubing, clamp it to the upright. Then stretch the tubing tight as you wrap it around the bend.*



**4** *When you've wrapped the tubing all the way around the bend, clamp it tightly against the support block.*

**5** *To ensure the edges of the strips bottom out against the stop, clamp the alignment block in place.*

**6** *Squeeze the strips tight against the support block by applying clamping pressure in the other direction.*

SHOP PROJECT

# Table Saw Insert

*This "zero clearance" table saw insert makes it safe and easy to cut thin strips.*

When ripping the thin strips for the serving tray and fishing net featured in this issue, one thing was clear.

I needed a way to keep the strips from falling into the opening between the saw blade and the insert. Otherwise, the strips could get wedged into the opening and kick back.

The solution is simple — replace the metal insert that comes with the saw with a "zero-clearance" insert that has an opening the same width as the blade, see photo above.

This prevents strips from getting jammed in the opening. And since the insert supports the workpiece right up next to the blade, it reduces chipout on the bottom.

Although the idea of a zero-clearance insert has been around awhile, this one has a couple of advantages over others I've seen.

**UHMW.** First, it's made from a special material called Ultra-High Molecular Weight (UHMW) plastic, see box on next page. This plastic is extremely slick, so the workpiece glides across the insert as you make a cut.

**FILLER STRIP.** Another unique thing about this insert is it has a replaceable filler strip, see inset photo. This way, if you have several different blades that cut different width kerfs, you just slip in the correct filler strip.

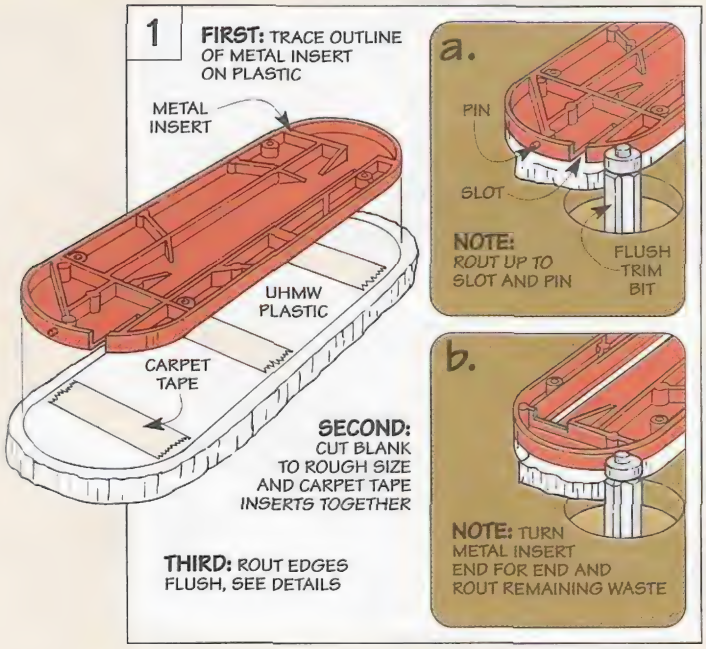
**SPLITTER.** Finally, each filler strip has a built-in splitter that prevents the kerf from closing and pinching the saw blade.

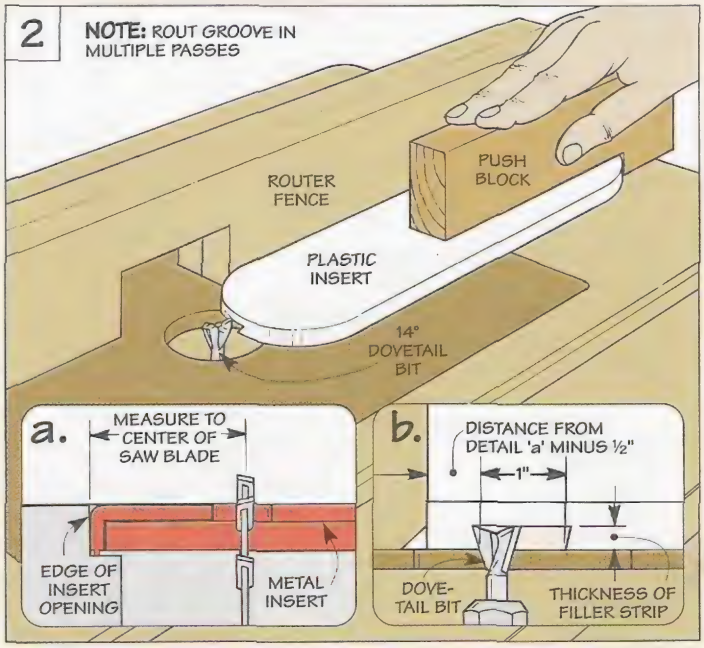
**BLANK.** The insert starts out as an oversize blank of UHMW. Note: To allow for leveling screws (added later), the blank should be within $1/16$" of the thickness of your metal insert.

To fit the insert into the opening in the saw table, you'll need to cut the blank to the same shape as the metal insert. So start by tracing the shape of the metal insert onto the blank, see Fig. 1.

After cutting the blank to rough size, it's just a matter of carpet-taping the two inserts together and routing the edges flush. (I used a flush trim bit in a table-mounted router.)

The thing to watch here is that most metal inserts have an open slot at one end for the splitter on the table saw. And there's usually a pin that holds the insert in place. As a result, there isn't a continuous smooth surface for the bearing on the bit to ride against.



So you'll need to first rout all the way around the edge except near the slot and pin, see Fig. 1a. Then turn the metal insert end for end and clean up the rest of the edge, see Fig. 1b.

**GROOVE.** The next step is to rout a dovetail-shaped groove that will hold the filler strip, see Fig. 2. This groove is centered over the saw blade. So you'll have to do a bit of arithmetic to locate the groove accurately.

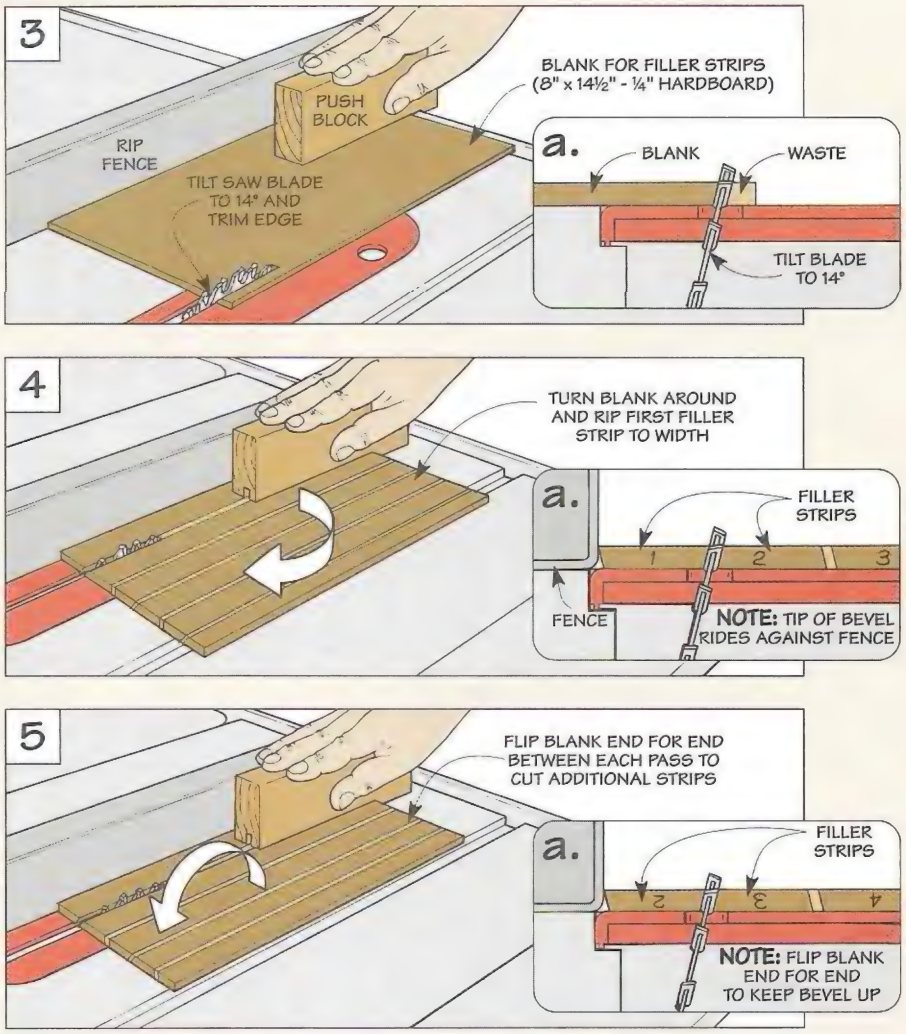
Start by measuring from the edge of the opening in the saw table to the center of the blade, see Fig. 2a. Then, to locate the router fence, subtract ½" (half the width of the groove), see Fig. 2b.

**FILLER STRIPS.** After routing the groove, you can cut the filler strips to fit. Each filler strip is a piece of ¼" hardboard with beveled edges to match the angled sides of the groove.

To fit the filler strip to the groove, start with a blank that's about 1" longer than the length of the groove, see Fig. 3. (The strips will be trimmed and sanded flush with the insert later.) Then tilt the saw blade so it matches the angle of the dovetail bit, see Fig. 3a.

**RIP STRIPS.** Now it's just a matter of ripping the filler strips to width. What you want here is to get the strips to fit snug, yet still slide in and out without binding. So you'll need to "sneak up" on a perfect fit.

This is a simple three-step process, see Figs. 3, 4, and 5. Just be sure that the tip of the bevel faces up as you slide the workpiece against the rip fence. This way, the tip won't get caught under the rip fence.




## UHMW Plastic

This Ultra-High Molecular Weight plastic (UHMW) is just the ticket for shop-made jigs and accessories.

**SLICK.** One reason is it's extremely slick. So there's very little friction as it slides against another material. This makes it ideal for the base of a tool (like a router), a miter gauge runner, or the facing on a fence.

**STABILITY.** Another thing I like about UHMW plastic is it won't expand and contract with changes in humidity. So once I cut it to fit a particular jig, I don't have to worry about it binding (or getting sloppy) as the seasons change.

**SOURCES.** You can get UHMW plastic in a variety of sizes and thicknesses, see photo. It's available from many woodworking catalogs, local plastic manufacturing companies, or from the sources listed below:

- Cope Plastics (800) 332-7257
- Trendlines (800) 767-9999

# The Splitter

Now you can turn your attention to the splitter. It prevents the saw kerf from closing and pinching the blade which can cause kickback.

To make this work, the splitter is installed *directly* behind the blade. The easiest way to determine this location is to first cut the opening for the saw blade in the insert and filler strip, see Fig. 6.

**BLADE OPENING.** But there's one small problem. Even if you lower the blade all the way down, it still hits the bottom of the insert when you set it in place.

To get around this, carpet-tape the plastic insert to the *top* of the metal insert, see Fig. 7. Then, after clamping a scrap to the fence to apply downward pressure, turn on the saw and raise the blade.

**SPLITTER.** Now you're ready to add the splitter. It's a piece of 1/8" hardboard that fits in a slot in the end of the filler strip. To cut this slot, I used a simple trick.

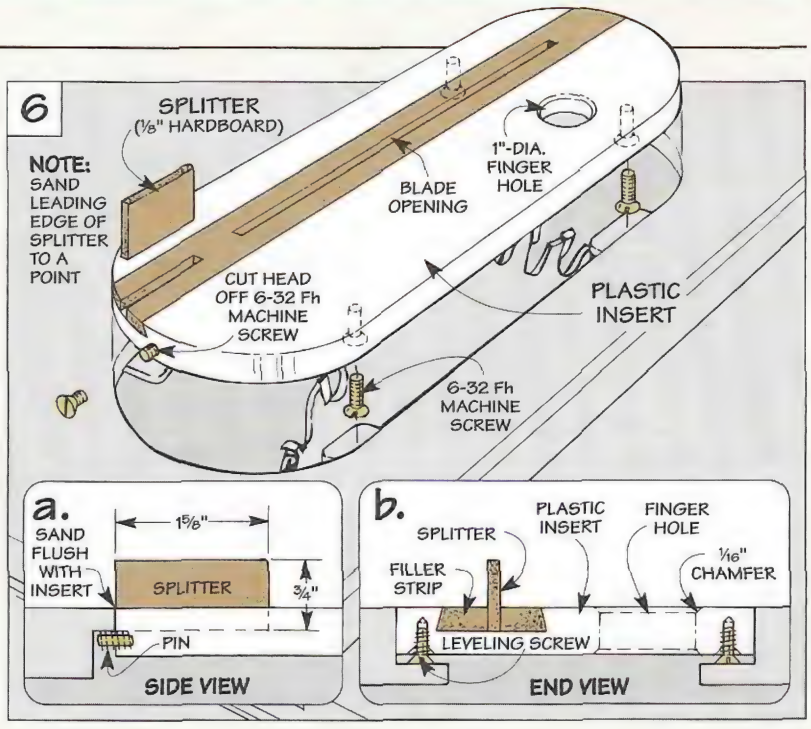
Without changing the setup, slide the filler strip out of the insert. (You'll need to lower the blade first.) Then, after raising the blade to its maximum height, slip the filler strip back in and feed it into the blade, see Fig. 8.

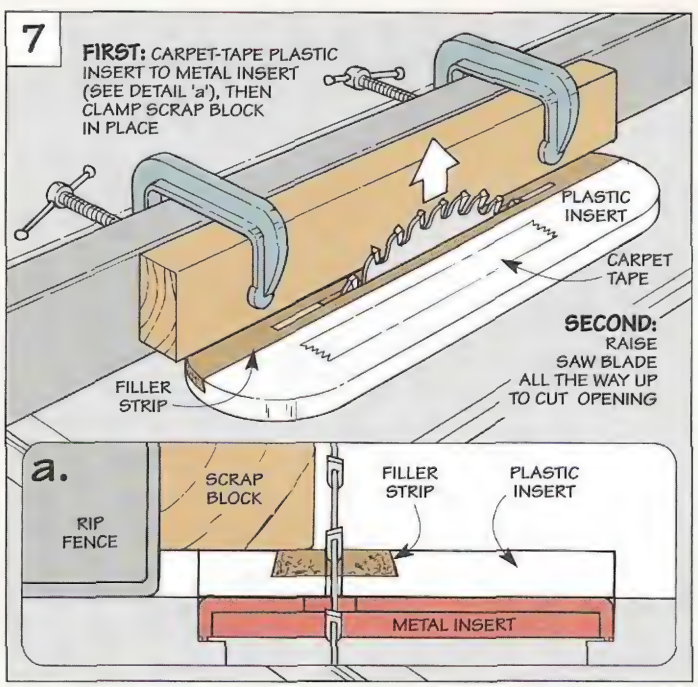
Once the slot is cut, you can glue in the splitter. Then, to avoid "catching" a workpiece, sand the leading edge to a point.

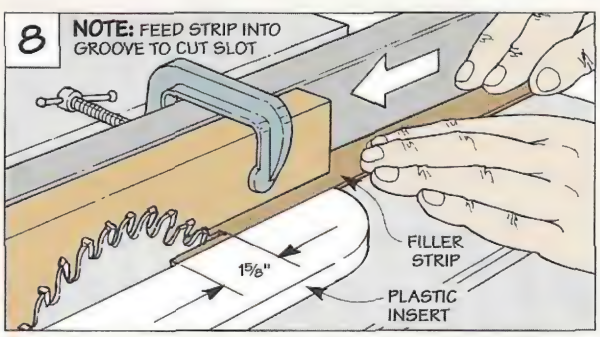
**FINGER HOLE.** Next, to make the insert easy to remove, I drilled a finger hole near one end, see Figs. 6 and 6b.

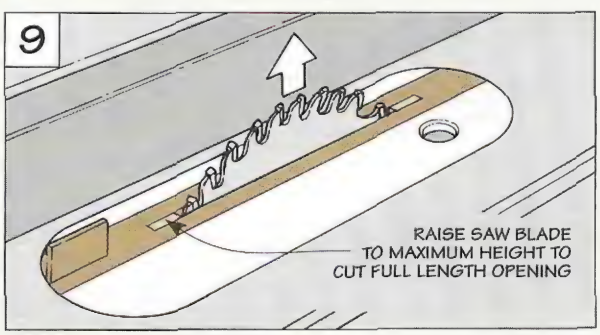
**PIN & LEVELERS.** You'll also need to install a metal pin in the end to hold the insert in place, see Fig. 6a. (I used a screw with the head cutoff.) And adding leveling screws to the bottom will let you adjust it flush with the table.

**EXTEND BLADE OPENING.** After leveling the insert, there's one last thing to do. That's to extend the blade opening to its full length by turning on the saw and raising the blade all the way up, see Fig. 9.



# Ripping Thin Strips

▲ *Ripping thin strips of wood is easy. The trick is to ensure that each one is the exact same thickness.*

It's easy to rip a thin strip of wood — at least in theory. Just set the rip fence, turn on the saw, and push the workpiece through the blade.

But in practice, it's not always that easy to end up with a strip that's *exactly* the same thickness from one end to the other.

This is especially important when you're cutting a number of strips for a bent lamination project (like the serving tray and fishing net in this issue). That's because any variation in the thickness will create a gap when the strips are glued together.

To rip thin strips that are uniform in thickness, I start by giving my table saw a quick checkup, see box below. Then, depending on the length of the strips, I use two different methods to rip them to the correct thickness.

**SHORT STRIPS.** One of the best ways I've found to safely rip short strips (less than 30") is to use a simple *push sled* that slides against the rip fence, see Fig. 1. It's just a piece of plywood with a scrap of wood glued on so it overhangs the edge, see Fig. 1a.

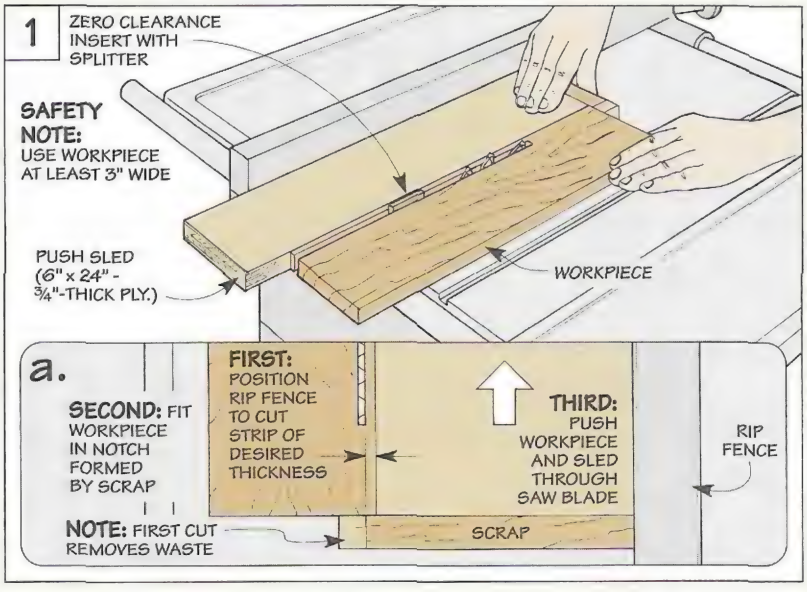
The idea is to fit the workpiece into the notch formed by the scrap. After positioning the rip fence to cut a strip of the desired thickness, slide the sled *and* the workpiece through the saw blade.

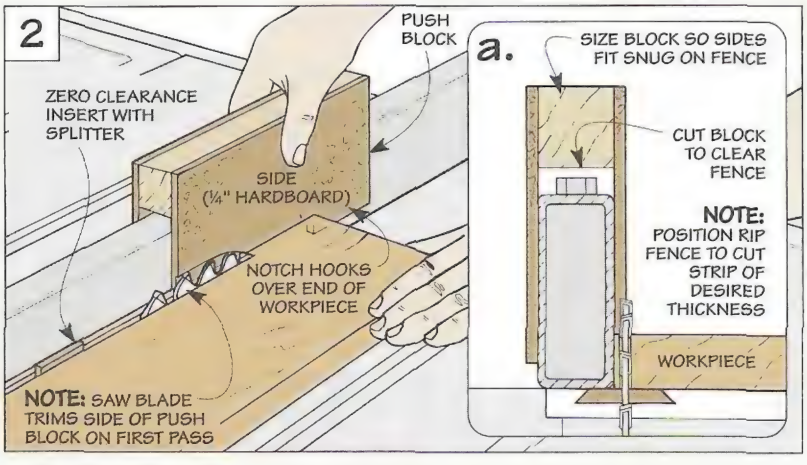
Once you set the rip fence, the important thing is not to move it again. Just repeat the process for the rest of the strips, and each one will be identical in thickness.

**LONG STRIPS.** Although this sled works great for short strips, it's a bit awkward when ripping a long board.

So I use a push block that straddles the fence, see Fig. 2. It's just a wood block with two hardboard sides glued on, see Fig. 2a.

The side directly over the workpiece applies downward pressure as you make a cut. And a notch hooks over the end of the piece to push it safely through the saw blade.




## Table Saw Checklist

**1** ***Saw Blade.*** *Use a sharp, combination blade to produce a smooth surface that won't require any additional sanding.*

**2** ***Table Saw Insert.*** *Install a "zero-clearance" insert in saw table to prevent strips from wedging in blade opening, refer to page12.*

**3** ***Square Blade.*** *Check that the blade is 90° to the table to ensure uniform thickness at the top and bottom edges of strips.*

**4** ***Rip Fence.*** *Adjust fence parallel to blade to rip strips that are the same thickness from one end to the other.*

SHOP PROJECT

# Flush Trim Jig

*This simple jig makes it easy to trim solid wood edging flush with the surface of a workpiece.*

Getting a piece of hardwood edging perfectly flush with the surface of a workpiece seems like it should be a simple thing to do.

But it often requires a lot of tedious scraping and sanding. Not to mention the fact that there's always a chance of accidentally scratching the surface. And if this surface is covered with thin veneer or a piece of plastic laminate, I don't like to risk it.

So to make it easy to trim the edging flush, I made a simple jig for my router, see photo above. The router is mounted to a platform that's cantilevered over the edging. So as you slide the jig across the workpiece, the router bit "planes" the edging flush with the surface of the workpiece. Note: This jig is designed to be used with a ½" straight bit.

**ADJUSTABLE STOP.** To allow you to rout right up to (but not past) the line where the edging meets the surface, there's an adjustable stop under the end of the platform. This stop is nothing more than a bearing that rides against the edge of the workpiece, see inset photo.

**EDGE GUIDE.** When you're not using the jig to trim edging flush, you can remove the stop and replace it with an edge guide, refer to photo on page 19. With the edge guide in place, you can use an ordinary straight bit to rout a rabbet without having to clamp a fence to your workpiece.

**PLATFORM.** The flush trim jig starts out as a simple *platform (A)* that supports the router, see Fig. 1. The platform is a piece of ¾"-thick MDF with the corners at one end cut at an angle.

To accept the stop (added later), an adjustment slot is cut near the angled end. And a hole provides an opening for the router bit to stick through. (I made the hole large enough so I could see the workpiece as I'm routing.)

**MOUNT ROUTER.** With the platform complete, the next step is to mount the router. The best way to locate the mounting holes is to use the base plate from your router, see Fig. 1.

What you want to do here is position the base plate so you'll have an unobstructed view through the opening in the side of the router and the hole in the platform. In my case, this meant laying out the holes so the han-

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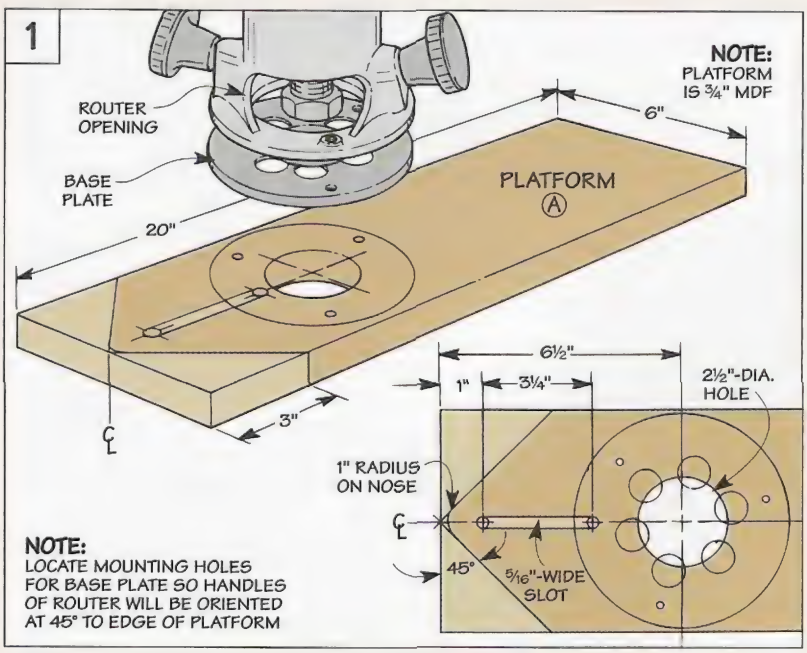


dles of the router would be about 45° to the platform, see photo on page 16.

Now it's just a matter of drilling the holes. To prevent the screws that hold the router in place from scratching the surface of a workpiece, don't forget to countersink the holes on the bottom of the platform.

**BASE.** The next step is to add a 1/4" hardboard *base (B)*, see Fig. 2. The base raises the platform *above* the surface of the workpiece so it extends over the edging as you rout. By lowering the bit *below* the platform, the edging is trimmed flush with the surface.

To provide support right up to (but not touching) the bit, the end of the base is cut at an angle, see Fig. 2a. Then the base is simply glued in place.

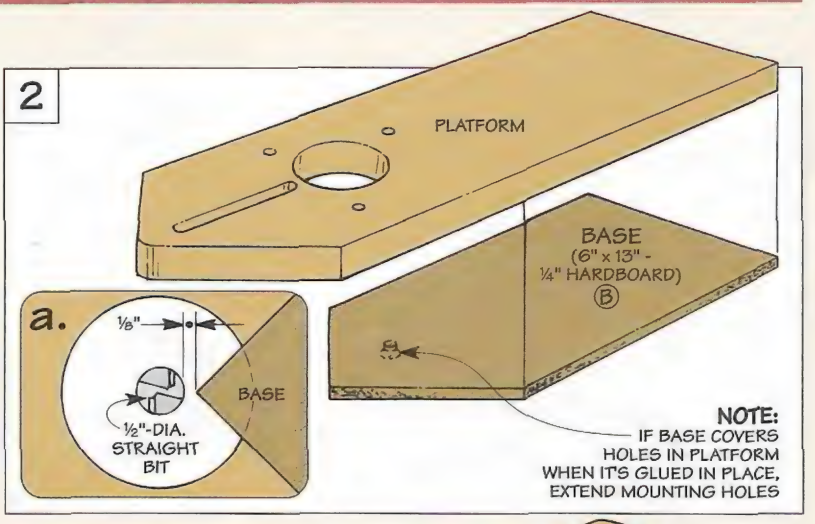
While you're routing, it's important that the end of the jig that's opposite the router is held down firmly against the workpiece. Otherwise the jig could tip and cause the bit to gouge the edging.

**HANDLE.** So to provide a comfortable grip, I made a long hardwood *handle (C)*, see Fig. 3. After shaping the handle and routing a finger recess (refer to page 31), it's simply glued and screwed to the platform.

**STOP.** Now all that's left is to add the adjustable stop. Basically, it's just a bearing that's attached to a hardwood *support arm (D)*, see Fig. 4.

The bearing is held in place with a machine screw and hex nut. But to ensure that it spins freely, a nylon spacer fits in the hole in the bearing. And a pair of washers "sandwich" the bearing.

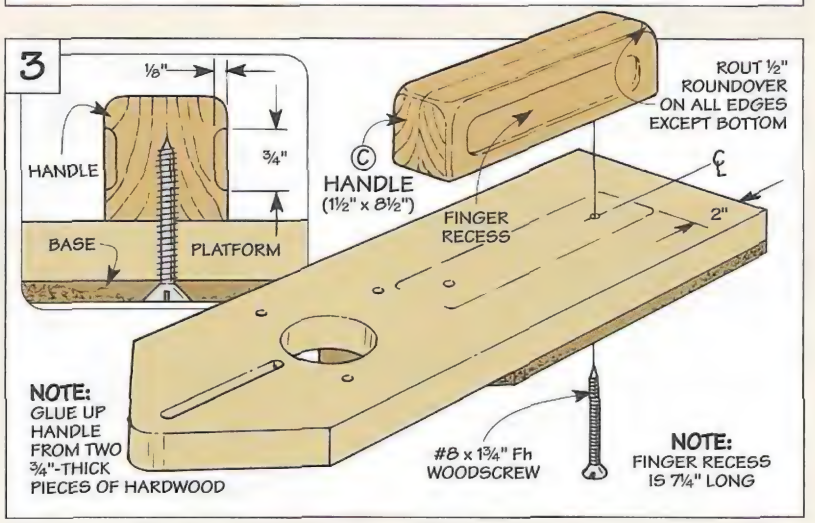
To make the stop adjustable, a dowel that's glued into the support arm slides back and forth in the slot in the platform. By tightening a threaded knob into a T-nut installed in the support arm, you can lock the stop in place.

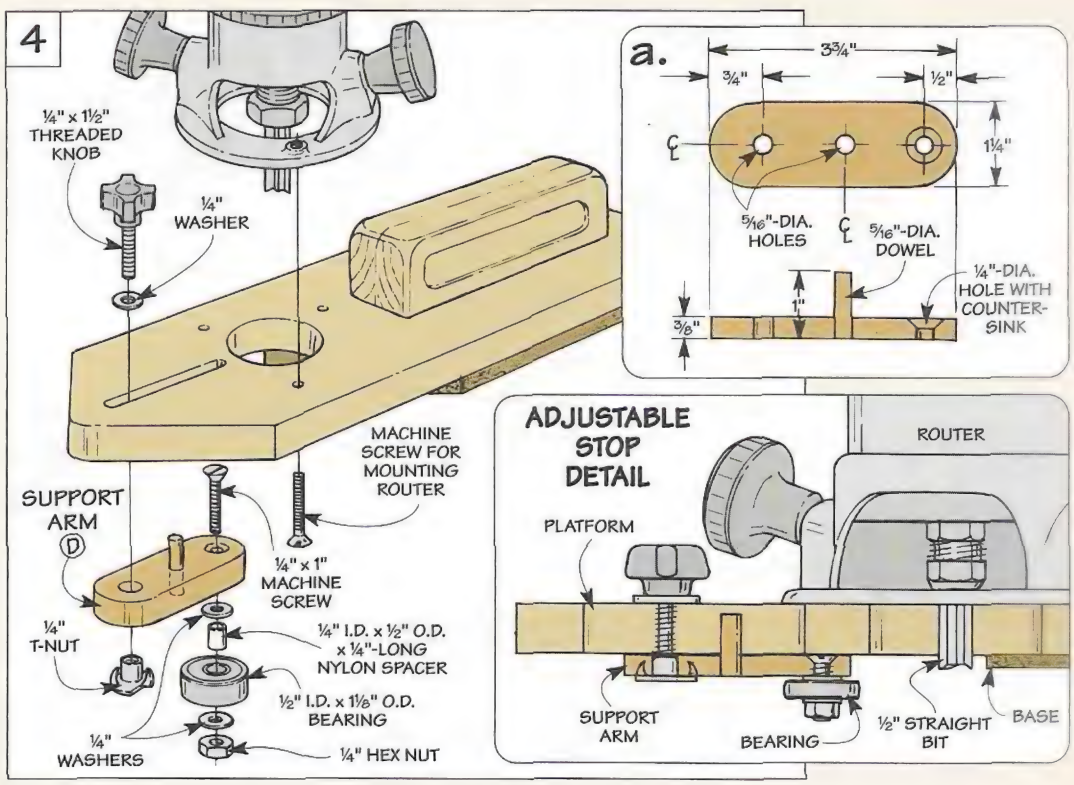



## Hardware

- (2) 1/4" x 1 1/2" Threaded Knobs
- (3) 1/4" Washers
- (1) 1/4" x 1" Machine Screw
- (1) 1/4" I.D. x 1/2" O.D. x 1/4"-Long Nylon Spacer
- (1) 1/2" I.D. x 1 1/8" O.D. Bearing
- (1) 1/4" Hex Nut
- (2) #8 x 1 1/2" Fh Woodscrews
- (2) 1/4" T-Nuts

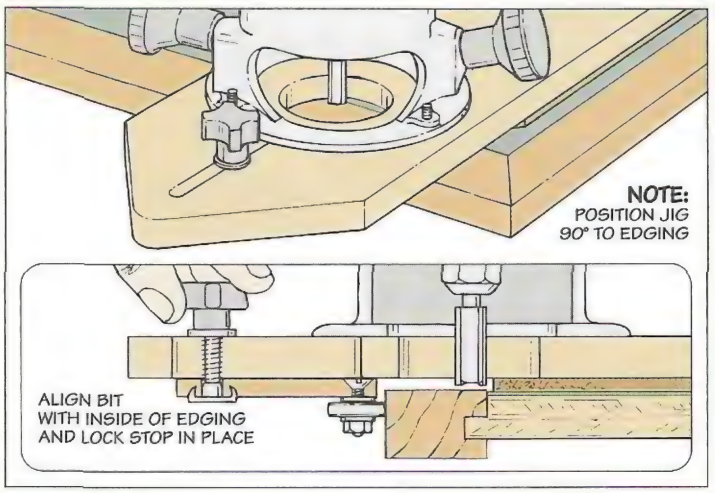
*For a complete hardware kit, call 800-347-5105.*
*6834-100.....$9.95*



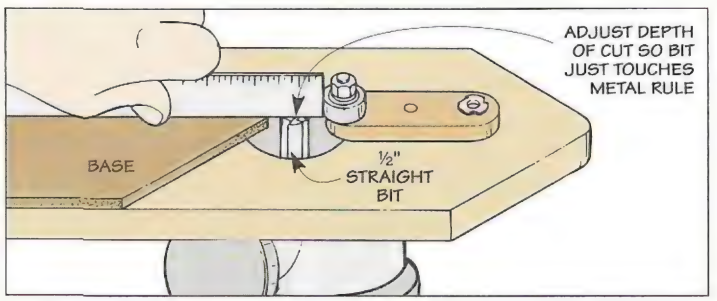



## Setup

*Step 1.* *Start by positioning the adjustable stop. To do this, align the cutting edge of the bit with the inside edge of the workpiece. Then slide the stop in until the bearing contacts the edging. After checking the alignment, lock the stop in place.*




*Step 2.* *An easy way to adjust the depth of cut is to hold a metal rule on the base of the jig. The bit should just graze the bottom of the rule.*




Once you've completed the flush trim jig, it only takes a few minutes to set it up.

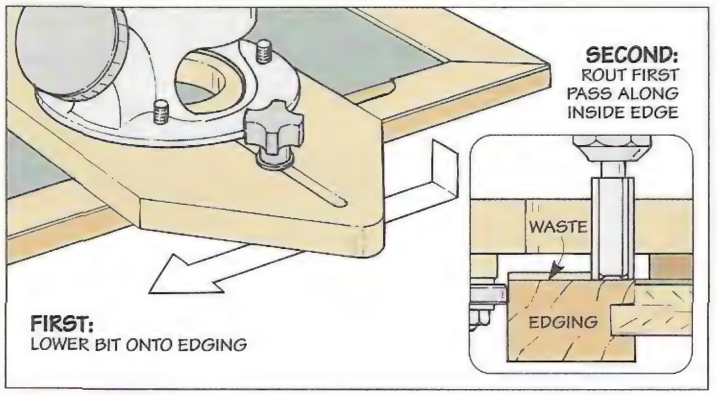
**STOP.** The first step is to set the adjustable stop. The goal here is simple. You want to position the bearing on the stop so the bit will cut right up next to (but not past) the point where the edging meets the plastic laminate (or veneer), see Step 1.

When setting the stop, check that the platform is perpendicular to the edging. This way, even if you angle the platform while you're routing, the bearing will still prevent the bit from cutting too far in from the edge.

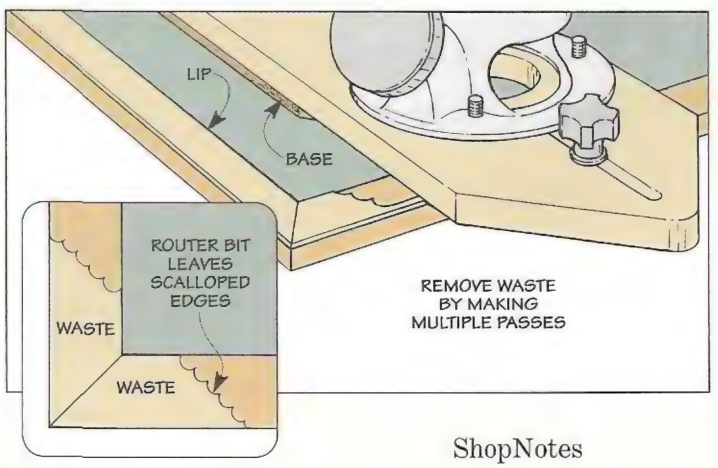
**DEPTH OF CUT.** The last thing to do is adjust the depth of cut. The idea is to adjust the bit so it's perfectly flush with the base, see Step 2. This way, the bit will trim the edging flush with the surface that the base is riding on.

## Using the Jig

*Step 1.* *With the base of the jig resting on the workpiece, raise the "nose" just a bit. Then slide the jig in until the bearing contacts the edging and lower the bit onto the workpiece. The first pass will clean up the material along the inside edge.*




*Step 2.* *Now make a series of passes to remove the bulk of the waste material. As you work your way toward the outside edge, the bit will leave a scalloped border near the corner that will be cleaned up later. But first, repeat steps 1 and 2 for each piece of edging.*




Once the jig is set up, you're just about ready to start trimming the edging.

But you can't just set the bit on the edging and turn on the router. That's because the bit is set to cut *deeper* than the part of the edging that sticks up above the plastic laminate on the surface.

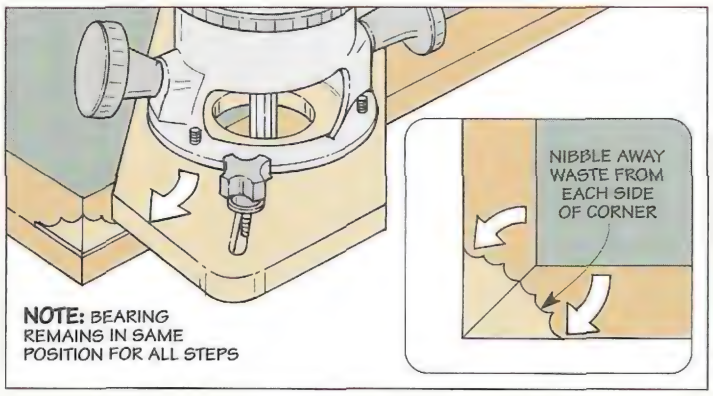
**FIRST PASS.** So to avoid accidentally gouging the edging, you'll need to lower the spinning bit onto the workpiece, see Step 1. Then just make the first pass by routing along the inside edge.

If the edging on the project wraps completely around (unlike a shelf for example where only the front edge is covered), there's one thing you'll notice as you're routing.

The bit won't cut clear to the end of the piece of edging. That's because the base of the jig will

hit the lip formed by the excess material on the *adjacent* piece of edging, see Step 2. As you work your way toward the outside edge, the tip of the base will contact the waste left by the previous pass. This forms a scalloped border at the corners.

**CLEAN-UP.** To clean up the corners, you'll need to "nibble" away at the waste by routing from both sides, see Step 3.




*Step 3. Working from the inside of the corner toward the outside, nibble away at the remaining waste by making multiple passes from each direction.*

# Edge Guide

As an option, you can remove the adjustable stop and replace it with an edge guide, see photo. Like its name implies, it guides the router along the edge of a workpiece so you can rout rabbets quickly and accurately.

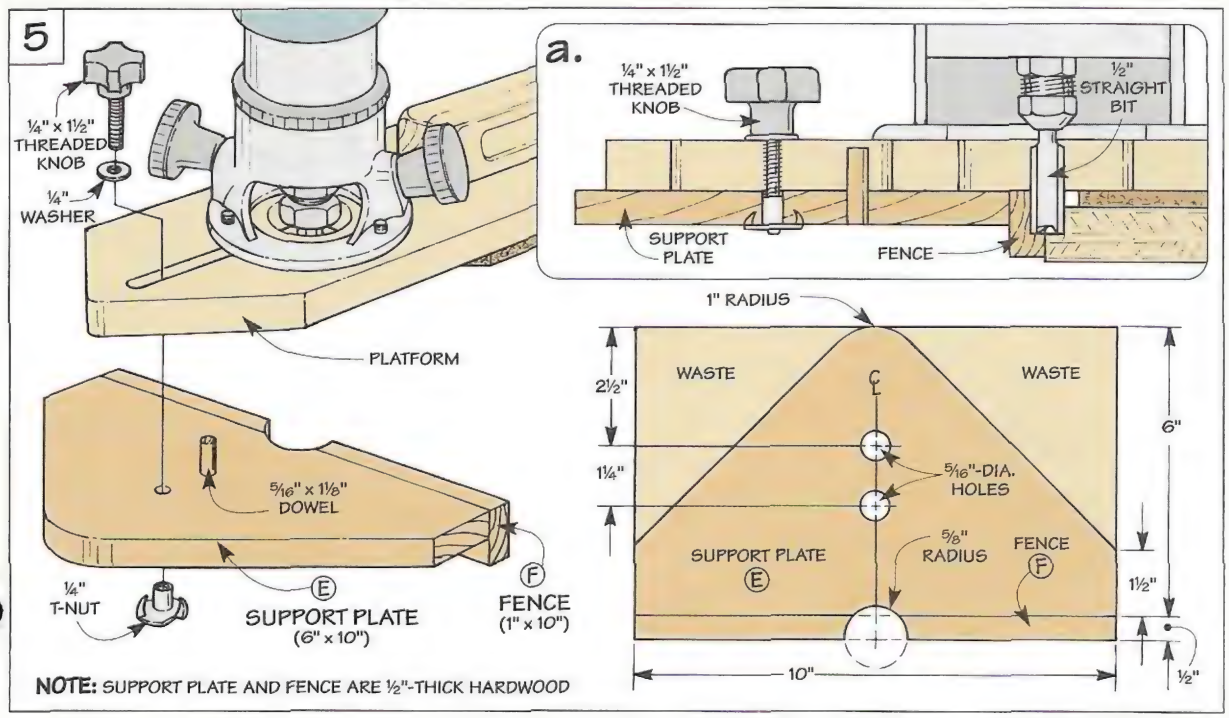
There's nothing complicated about the edge guide. It consists of a triangular-shaped *support plate (E)* with a *fence (F)* glued to the long edge, see Fig. 5.

**ADJUSTABLE.** To make the edge guide adjustable for rabbets of different widths, the support plate needs to slide in and out.

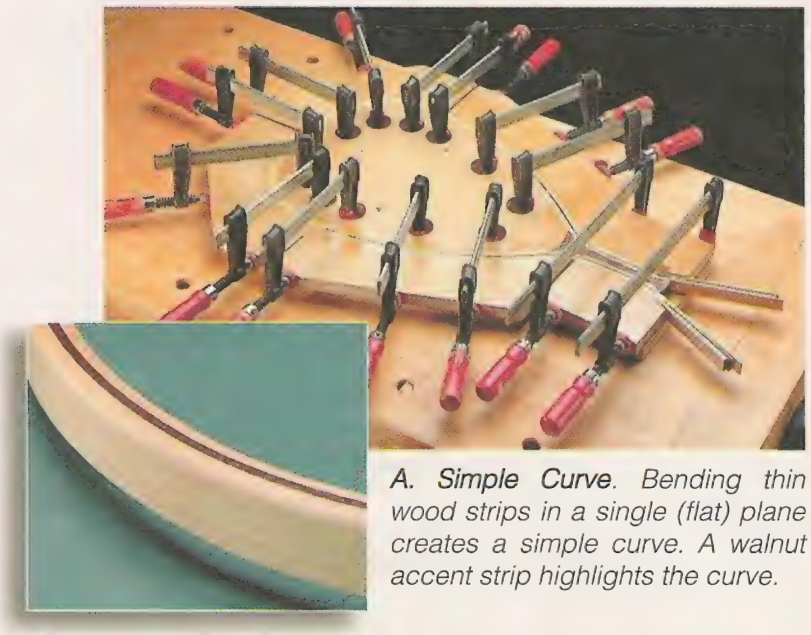
So I used the same idea as with the stop — a dowel that's glued into a hole near the long edge. To keep the edge guide aligned as you adjust it in and out, this dowel fits in the slot in the platform. And a threaded knob tightens into a T-nut to lock the edge guide in place, see Fig. 5a.

**FENCE OPENING.** Before using the edge guide, there's one more thing to do. To provide clearance for the router bit, you'll need to cut a semi-circular opening in the edge with the fence, see detail in Fig. 5.

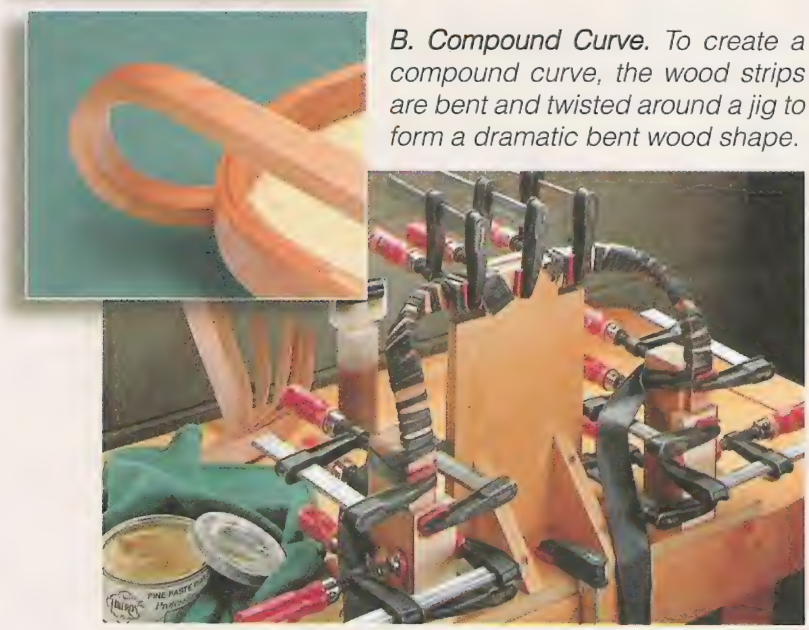
*Edge Guide. By replacing the stop with a triangular-shaped edge guide, you can rout rabbets quickly and accurately with an ordinary straight bit.*



# Bent Lamination



*A. Simple Curve. Bending thin wood strips in a single (flat) plane creates a simple curve. A walnut accent strip highlights the curve.*



*B. Compound Curve. To create a compound curve, the wood strips are bent and twisted around a jig to form a dramatic bent wood shape.*

How do you get a straight, rigid piece of wood to bend in a smooth, flowing curve? One way is with a technique called *bent lamination.*

Basically, it involves ripping a bunch of thin, flexible strips of wood and applying glue to each one. Then, after stacking the strips in layers like a sandwich, they're bent around a jig and squeezed together with clamps. This is the most challenging part of the whole process — and the messiest.

As you wrestle the slippery strips around the jig, they slide up and down (and forward and back) against each other. And while you're trying to corral the strips, glue is oozing out everywhere.

But when the glue dries and you remove the clamps, the reward is worth it — a piece of wood that's bent to the perfect shape. Granted, it's covered with a thick crust of dried glue. But with a little scraping and sanding, a beautiful bent lamination with smooth, graceful curves begins to emerge.

## SIMPLE & COMPOUND CURVES

Depending on the design of the project, you can bend wood into either a *simple* or *compound* curve.

**SIMPLE.** To create a simple curve (like the frame of the fishing net for instance), the wood strips that are bent around the jig remain in a single, flat plane, see photo A.

While a simple curve is attractive all by itself, you can use wood strips that contrast in color to produce even more dramatic results. The walnut accent strip in the frame of the fishing net is a good example. By highlighting the curve, it makes the frame look like a piece of old-fashioned ribbon candy, see inset in photo A.

**COMPOUND.** Bending wood into a compound curve (like the handles of the serving tray) is a bit trickier. That's because the wood strips are bent *and* twisted around the jig, see photo B. So the handles start to bend in one direction, then actually "turn the

*Weak Grain. Cutting a curved piece from solid wood creates weak spots where the grain "runs out." So it's likely to break.*

*Strong Grain. The key to the strength of a curved form that's made by gluing up thin strips of wood is simple — the grain "follows" the bend.*

corner," see inset in photo B on opposite page.

## STRENGTH

Now you might think that a bent wood form would be extremely fragile. But that's not the case. In fact, it's considerably stronger than a curved piece that's cut from solid stock.

**GRAIN DIRECTION.** The reason has to do with grain direction. When you glue up thin strips of wood into a curved form, the grain runs *around* the bend, see drawing on opposite page. So the grain acts like a continuous thread that reinforces the piece — even when it's bent in a tight curve.

But if you cut a solid piece of wood into the same curved shape, there's a weak spot where the grain "runs off" the edge. And even a small amount of pressure can cause it to break.

## THIN STRIPS

Grain direction also plays a big part in how easy it is to bend the thin strips around the jig.

**STRAIGHT GRAIN.** To prevent the strips from breaking, the goal is to end up with straight grain on the *edge* of the strips. This way, the wood fibers will lay nice and flat when you bend the strip — almost like you're smoothing the fur on a cat, see detail 'b' in drawing at right.

So if the straightest grain is on the face of the board, all you need to do is rip the strips to the desired thickness, see drawing. (For more information on ripping thin strips, refer to page 15.)

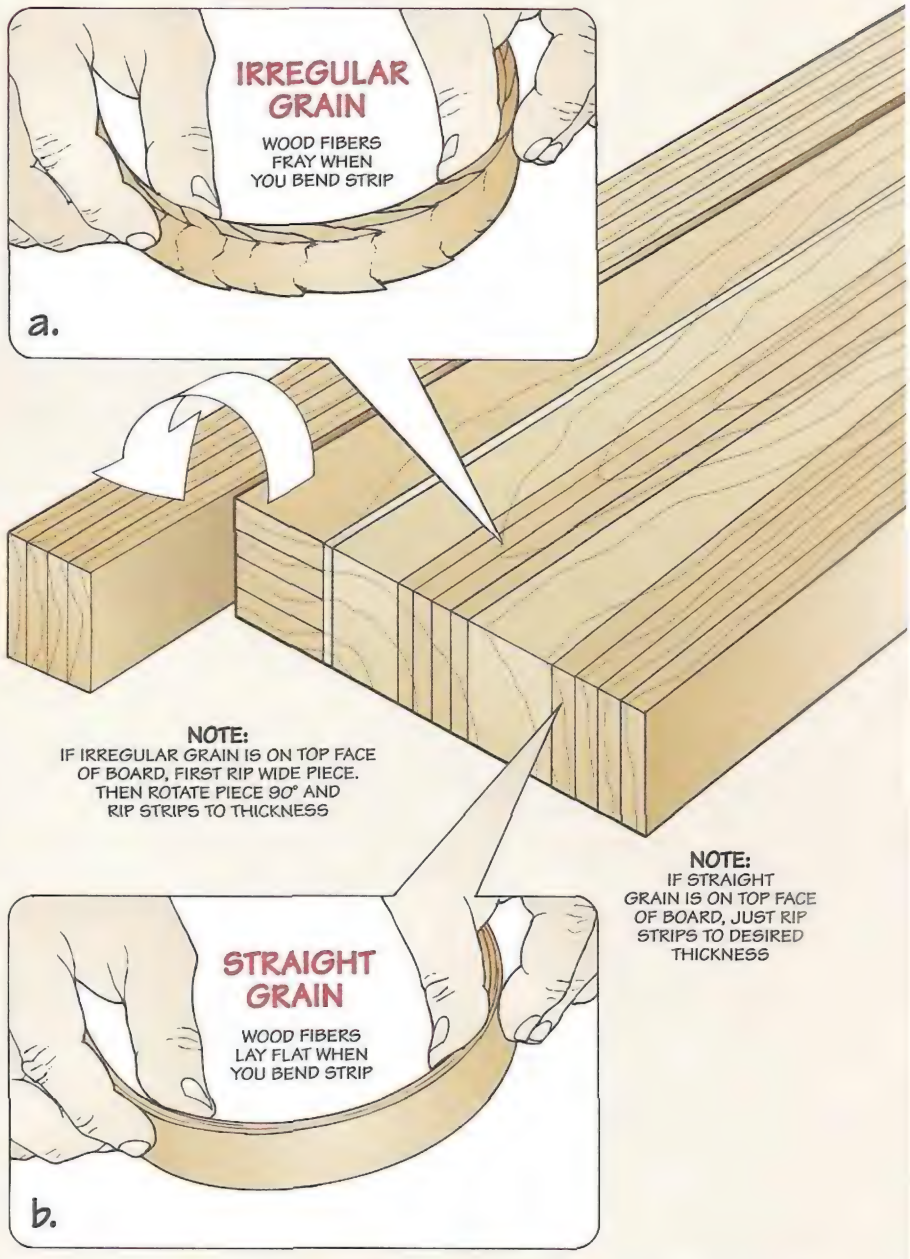
**IRREGULAR GRAIN.** But if the grain on the edge runs in an irregular pattern, the wood fibers will start to fray as you bend the strip, see detail 'a.' Almost as if you're stroking the fur in the wrong direction. And that's a good indicator that the strip will break.

**RIP & FLIP.** What if the straight grain is on the *edge* of the board (not the face)? Just rip a piece to the width of the finished strips (plus $\frac{1}{16}$" to allow for clean-up), see drawing. Then flip that piece on edge and rip the strips with the straight grain up.

**THICKNESS.** In addition to the grain, another consideration is the thickness of the strips. As a rule, I use the *thickest* strip that I can bend around the jig without breaking. Depending on how tight the bend is, that's usually between $\frac{1}{16}$" and $\frac{1}{8}$" thick.

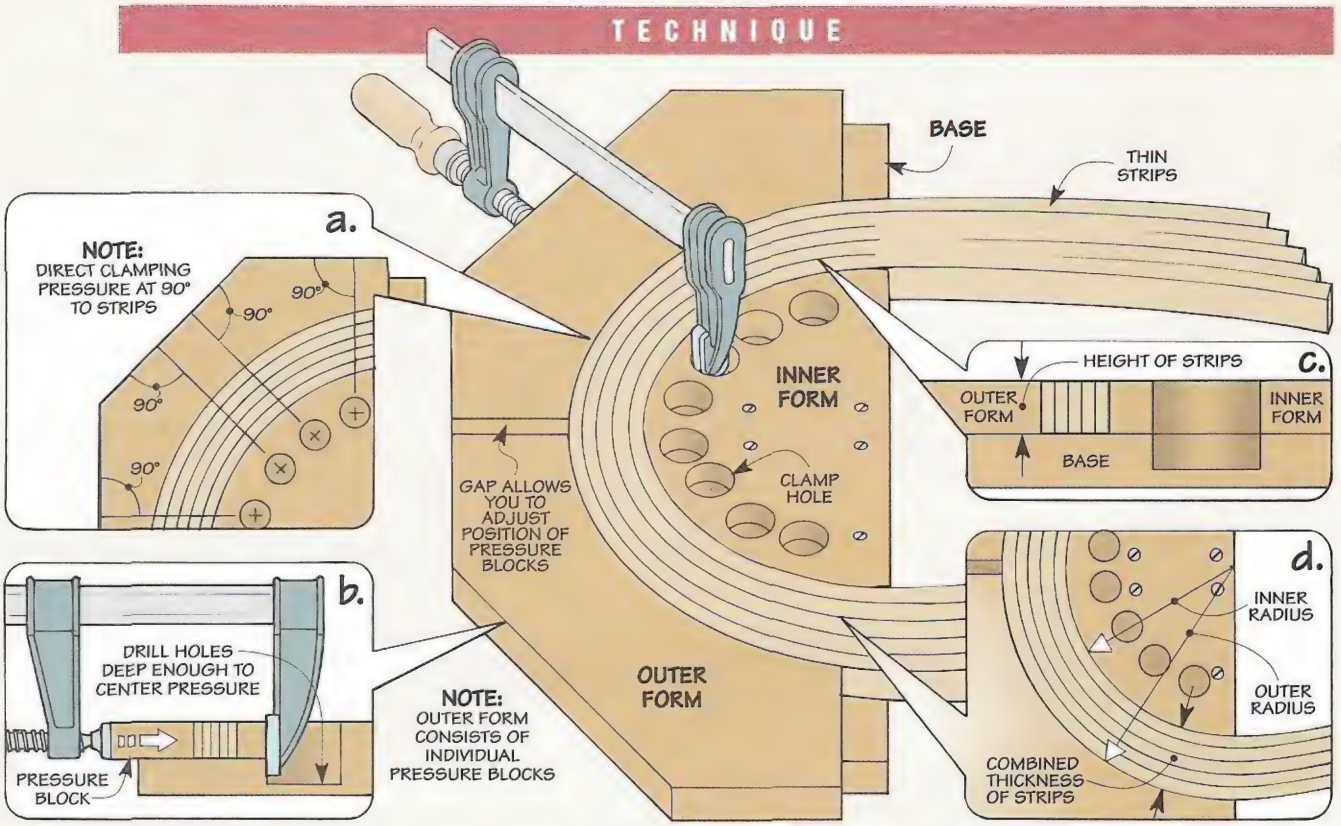
To find out for sure, you'll need to bend a test strip. If it starts to break, try another one that's $\frac{1}{32}$" thinner. This doesn't sound like much. But it can make all the difference between bending and breaking.

**SOAK STRIPS.** To make the strips even more flexible, you can soak them in water and pre-bend them. This made the strips we used for the fishing net and the serving tray extremely pliable.




## Tips on Ripping Thin Strips

1. ***Select Clear Wood.*** *Wood with straight, clear grain bends best. So avoid using wood with knots or highly figured grain.*
2. ***Rip for Straight Grain.*** *To reduce the chance of breaking a strip, rip each one so the straight grain is on the edge.*
3. ***Cut Strips Oversize.*** *To allow for final trimming and clean-up, cut strips about 2" longer and $\frac{1}{16}$" wider than final size.*
4. ***Arrange Strips.*** *By arranging strips in order as they're cut off the board, the bent lamination will look like a piece of solid stock.*
5. ***Make Extra Strips.*** *Just in case a strip does break during glue-up, it's a good idea to rip a few extra strips.*



# Simple Curves

To bend wood in a simple curve, I use a jig that works like a big press. The strips are stacked together and then laid on edge on the *base* of the jig, see drawing above. Then, after bending the strips around an *inner form*, they're pressed tightly together by clamping an *outer form* against them.

## EVEN PRESSURE

The key to squeezing the strips together so there are no gaps is to apply *even* clamping pressure all the way around the inner and outer forms.

**HEIGHT.** Even something as simple as the height of the forms makes a difference — especially along the top edges of the strips. To draw these edges together, make the forms at least as tall as the height (width) of the strips, see detail 'c.'

**SHAPE.** Another thing that affects how evenly the clamping pressure is applied is the *shape* of the inner and outer forms. To press the strips tightly together, the curved edges of these forms should fit against the strips like a shell around a nut.

Establishing the curved shape of the inner form is easy. It just depends on the design of the project. The trick is getting the curved edge of the outer form to mold tightly around the strips.

To do this, you'll need to take the combined thickness of the strips into account, see detail 'd.' Then make the radius of the outer form that much larger.

**SAND EDGES.** But there's more to getting a good fit between the forms and the wood strips than just their shape. The curved edges of the forms also need to be sanded nice and smooth. Otherwise, any irregularities will be transferred to the strips.

**PRESSURE BLOCKS.** Once the edges are sanded smooth, it's a good idea to cut the large outer form into smaller *pressure blocks*. (The small blocks are easier to work with during glue-up.) I leave a $\frac{1}{4}$" opening between adjoining blocks. This way, if there's a gap between the strips during glue-up, I can nudge a block one way or the other to close it up.

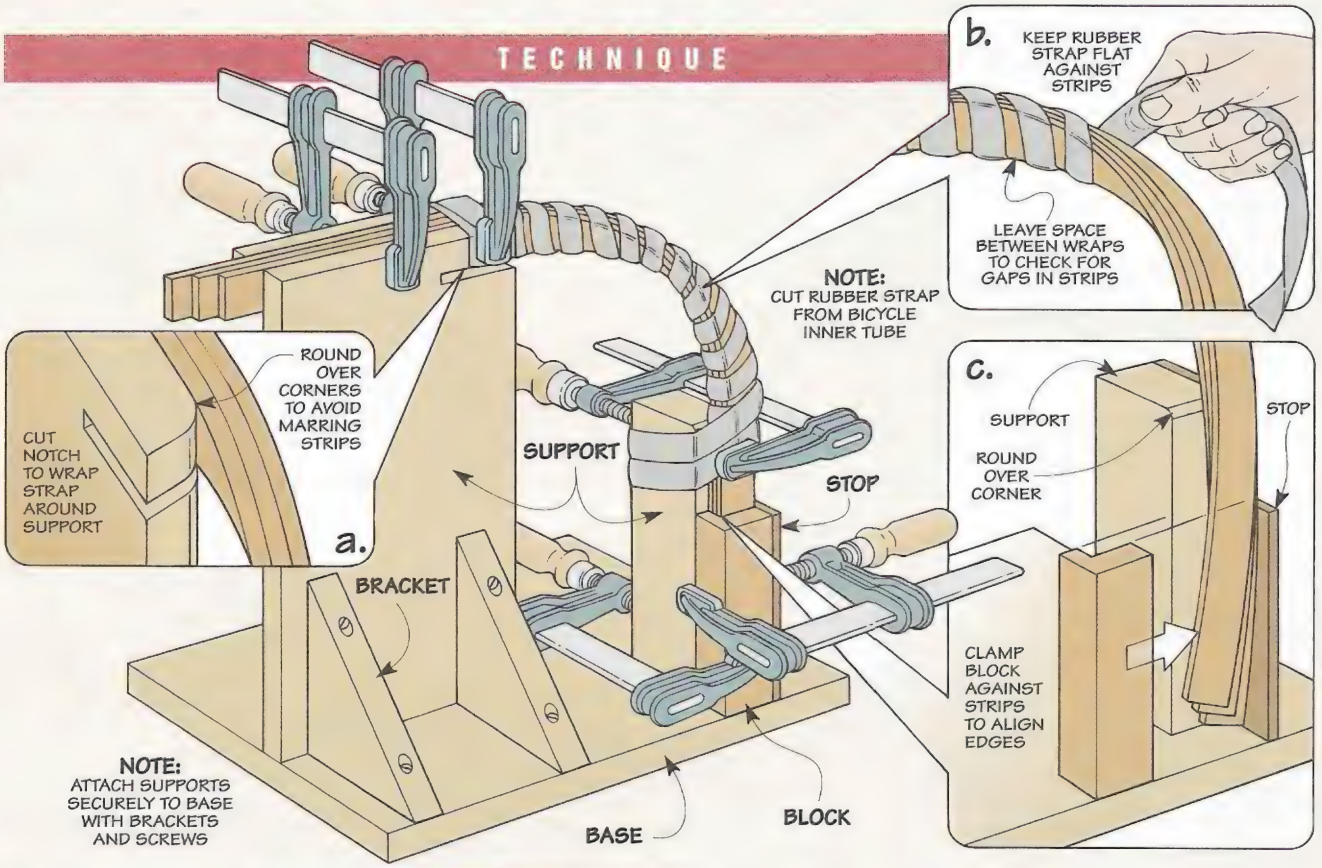
## CLAMP POSITION

One last thing that affects how tightly you can squeeze the strips together is the position of the clamps on the jig.

**CLAMP HOLES.** The clamps are hooked into holes drilled along the perimeter of the inner form. Don't worry about getting these holes too close together. It's better to have too many clamps than not enough.

Just be sure the holes are deep enough that the clamping pressure is centered on the edge of the pressure block, see detail 'b.' This way, the pressure blocks won't lift up when you tighten the clamps.

**90° PRESSURE.** Finally, to keep the strips from sliding back and forth against each other, you want to direct the clamping pressure *across* the strips at right angles, see detail 'a.' Trimming the corners of the pressure blocks at an angle will provide a good clamping surface that will orient the clamps and keep them from slipping.




## Compound Curves

If you're bending wood into a compound curve, the process for making a jig is reversed. You start by bending a single strip of wood to the shape you want, see photo. Then build a jig to support it.

**FREE-FORM.** The biggest difference here is you'll be bending the strip of wood in mid-air like a free-form sculpture.

To get the strip to hold its shape, you'll need to anchor one end. (I just clamp the strip to a scrap block that's attached to a base.) Then, after bending and twisting the strip to the desired shape, secure the opposite end with another scrap.

### CLAMPING SYSTEM

Bending a single strip of wood into a compound curve is fairly easy. But before you can bend a stack of strips, you'll need a clamping system that will squeeze them tightly together.

**CLAMPING SURFACES.** The first step is to create clamping surfaces for the straight sections of the strips. These are just vertical supports that are securely attached to the base, see drawing above. To keep the sharp edges of the supports from digging into the strips as they're bent around, you'll want to round over the corners, see detail 'a.'

**FLEXIBLE CLAMP.** But a rigid clamping surface would crush the edges of the strips where they bend and twist. So I use a flexible "clamp" instead. It's just a piece of an inner tube from a bicycle tire. But it applies lots of pressure as you stretch and wrap it around the bend. Keep the tubing flat as you wrap it around. And leave some space between each wrap so you can check for gaps, see detail 'b.'

**ALIGNMENT.** One last thing you'll notice as you bend the stack of strips is the edges tend to splay out of alignment, see detail 'c.' But clamping a block against the strips makes it easy to align the edges.

## Glue-Up

Whether you're making a simple or a compound form, gluing up the strips is basically the same.

**VARNISH & WAX.** Before you get started, make sure you varnish the jig and apply a coat of paste wax. This keeps the glue from adhering to the parts of the jig.

**WORKING TIME.** Also, things can get a bit hectic during glue-up. So I use a white glue or hide glue that gives me plenty of working time. Or, if the glue needs to be waterproof, a polyurethane glue is ideal.

Once you apply the glue (I just brush it on) and bend the strips around the jig, it's best to leave them clamped up overnight to ensure a good bond.

# Fishing Net

Whenever you get a group of guys together around here, it's a pretty safe bet that the conversation will eventually get around to two things — woodworking and fishing.

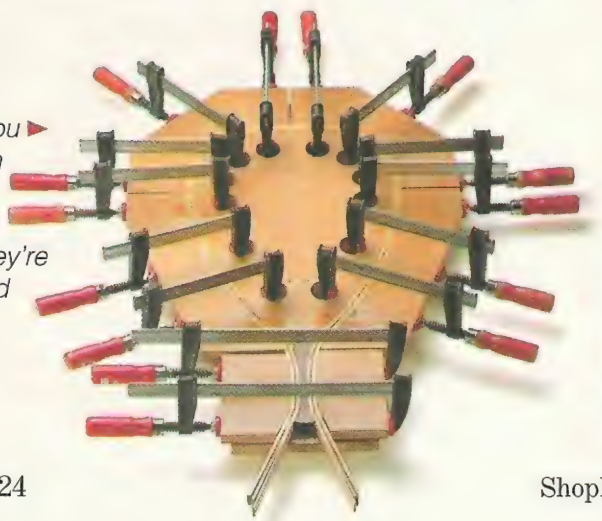
So it's not surprising that this fishing net generated *lots* of excitement. Not only is it a practical project for a fisherman. But it offers an interesting challenge to a woodworker as well — making a wood frame for the net that bends in a graceful curve.

The secret is to start with thin, flexible strips of wood. (We used maple and walnut to create a nice contrast.) By bending these strips around a jig and gluing them together, you end up with a curved frame that's both rigid and strong. (For more information on bent lamination, refer to page 20.)

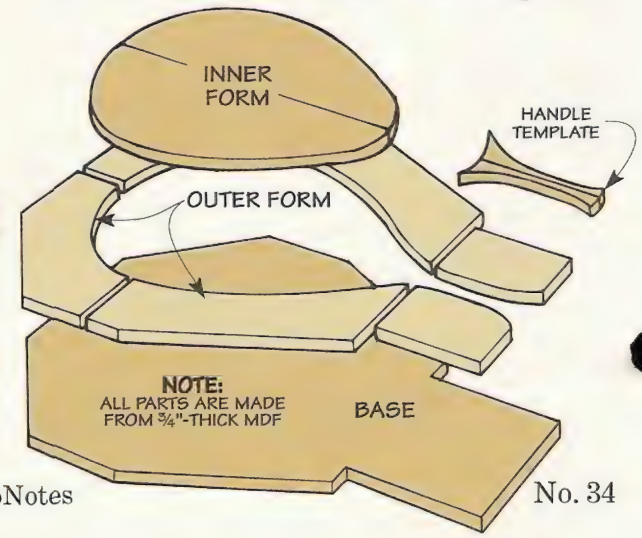
## BENDING JIG

Before you get started on the frame, you'll need to make the bending jig. It consists of three main parts: an *inner form* to bend the strips around, an *outer form* that distributes the clamping pressure evenly against the strips, and a *base* that serves as a worksurface, see drawing below.

Note: I used ¾"-thick MDF for all the parts of



**Bending Jig.** *After you apply glue to the thin strips that make up the curved frame of the fishing net, they're bent around a jig and clamped in place.*



the jig, but plywood would work just as well.

**INNER FORM.** I began by making a two-part *inner form*. It determines the basic shape of the curved frame. Each part of the form starts off as a rectangular blank, see Fig. 1. Then a pattern that shows the basic shape of *half* of the frame is drawn on one blank, see pattern below.

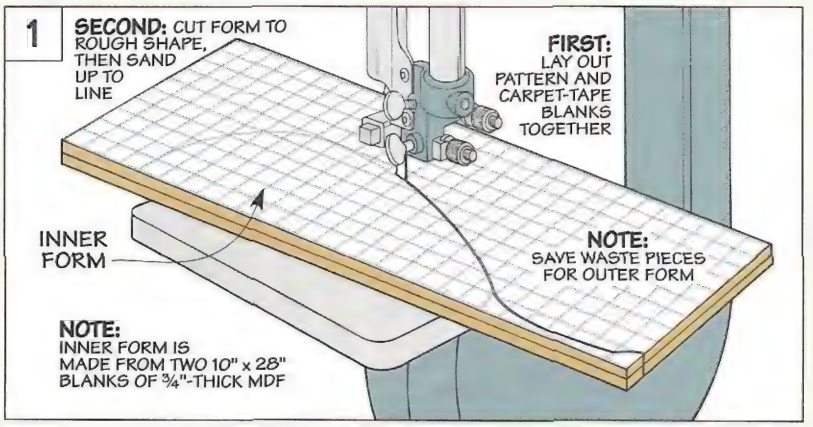
To produce a smooth, consistent curve all the way around the frame, both parts of the inner form need to be identical. So it's best to carpet-tape the two blanks together and shape both of them at the same time.

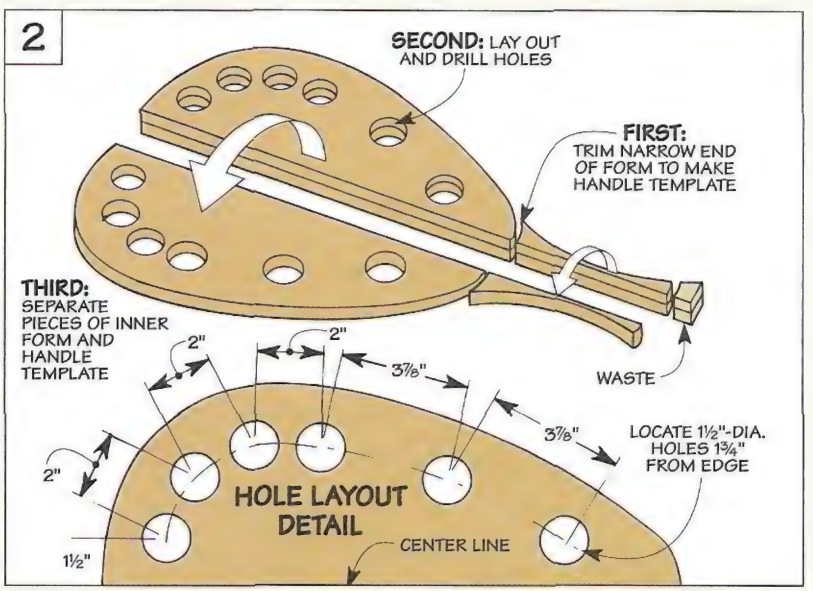
Start by cutting to the waste side of the layout line with a band saw (or sabre saw), see Fig. 1. Just be sure to save the "waste" piece. It's used later to make the outer form.

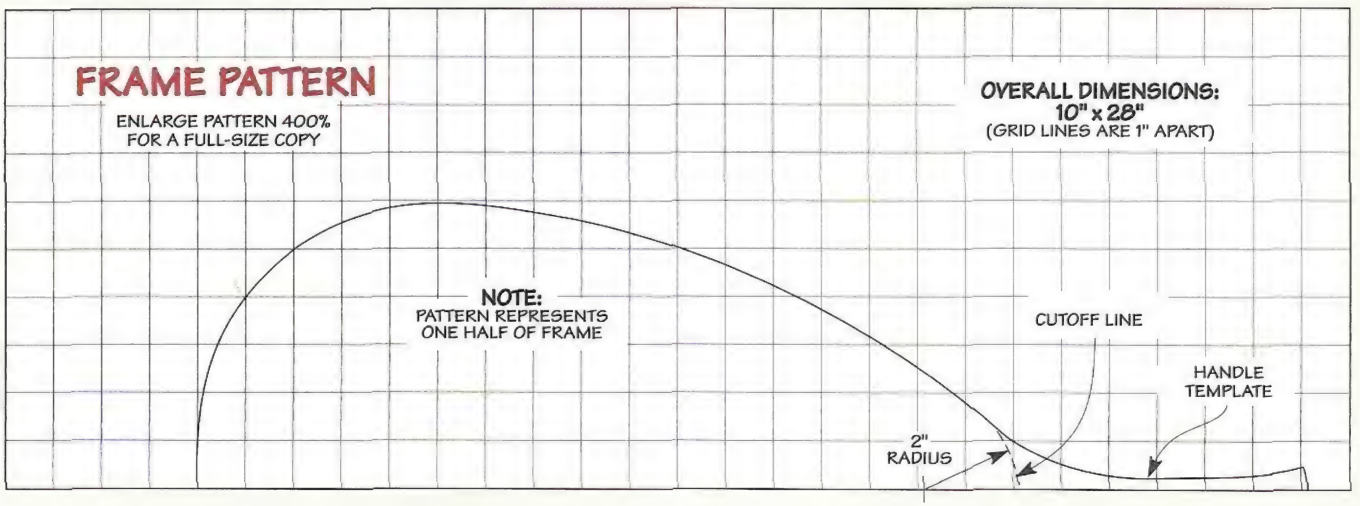
**SAND EDGES.** After cutting the blanks to rough shape, the next step is to sand the edges up to the line. (I used a drum sander on the drill press.) To ensure the inner form doesn't "telegraph" any irregularities to the strips, you want the edges to be as smooth as possible.

**HANDLE TEMPLATE.** At this point, there's one more bit of shaping to be done. To make a template for the handle of the fishing net later, you'll need to trim off the narrow end of the form, see Fig. 2. Then just separate the pieces and set them aside.

**DRILL HOLES.** Before separating the parts of the inner form, the last step is to drill holes around the perimeter. These holes form pockets that accept the heads of the clamps when gluing up the strips.



# Base & Outer Form

With the inner form complete, you can turn your attention to the base and the outer form.

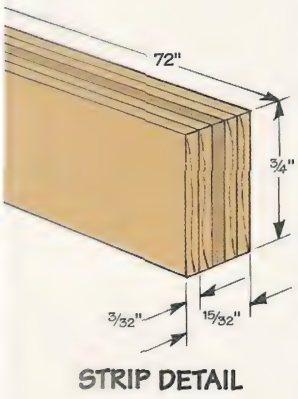
## BASE

The base anchors the inner form. And it serves as a platform for both the inner and outer forms.

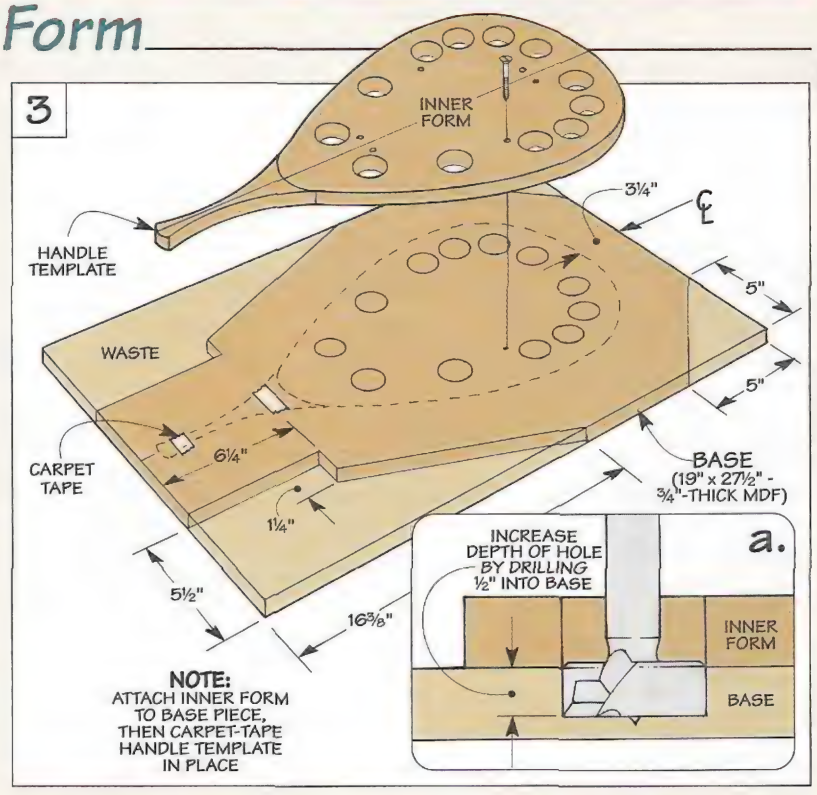
**SIZE & SHAPE.** The base is about 1" *smaller* than the overall size of the inner and outer forms. Yet it still has to support the outer form. So the shape of the base "mirrors" the angled edges of the outer form, see Fig. 3.

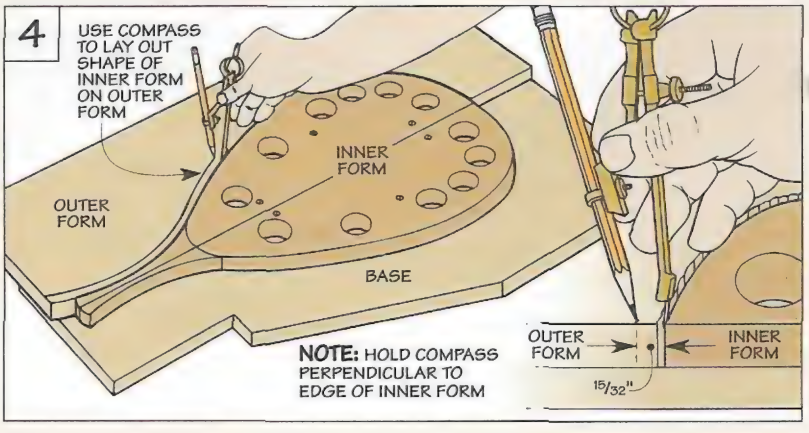
**ATTACH INNER FORM.** After cutting the base to shape, the inner form is glued and screwed in place. Then to help center the clamping pressure, you'll need to extend the holes in the inner form, see Fig. 3a.

**HANDLE TEMPLATE.** To make it easy to lay out the outer form later, the next step is to temporarily carpet tape a template of the handle to the base, see Fig. 3. The template is made by gluing up the two narrow pieces from the inner form that were set aside earlier.



STRIP DETAIL



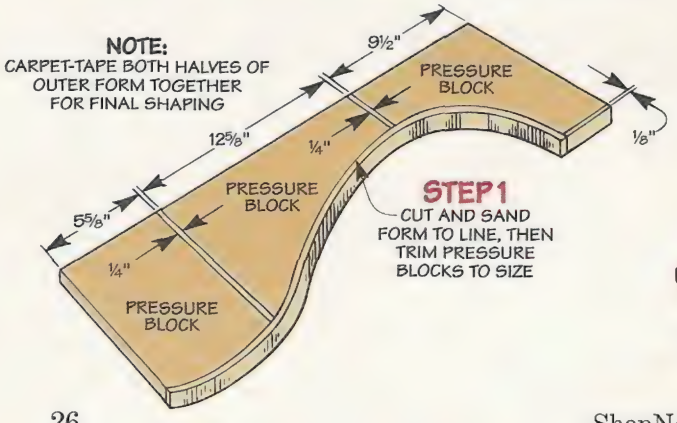

## OUTER FORM

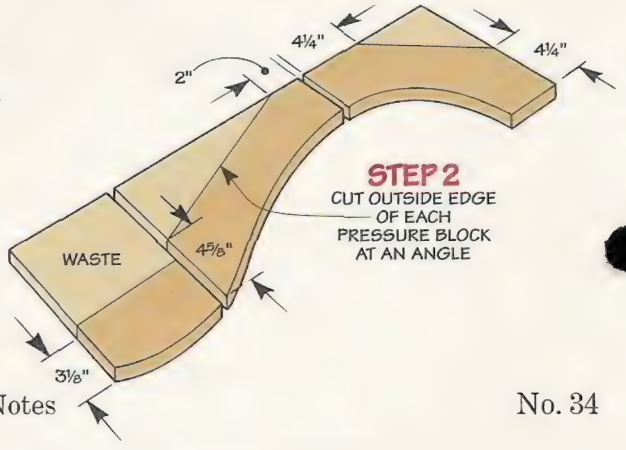
Now you can add the outer form. It consists of six pressure blocks that squeeze the strips tight against the inner form, refer to drawing on page 24.

The pressure blocks are made from the waste pieces of the blanks used for the inner form, see Step 1 below. But don't cut them apart just yet.

Even though the inside edge of each piece is already curved, it won't fit tight against the strips. That's because it doesn't take into account the *thickness* of the strips. So you'll need to reshape the inside edge so it fits around the strips like a glove.

Start by setting a compass to



the *combined* thickness of the strips. (In my case, this was 15/32", see margin on opposite page.) Then use the compass to lay out a line on the outer form, see Fig. 4.

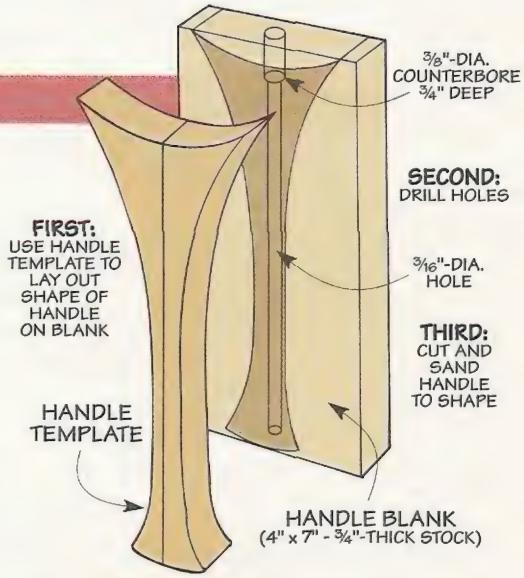
Note: I cut five 3/32"-thick strips from 3/4"-thick stock (four maple strips, and one walnut strip). It's also best to start with extra-long strips. (Mine were 72" long.)

Once you lay out the curve on the outer form, cut up close to the line and sand the edges smooth, see Step 1 on page 26. After cutting the individual pressure blocks to size, the outside edges are trimmed at an angle, see Step 2. This way, the pressure applied by the clamps will be directed at right angles to the strips.

**VARNISH & WAX.** There's one last thing to do to complete the jig. To keep glue from sticking to the parts of the jig, I applied two coats of varnish and a coat of wax.

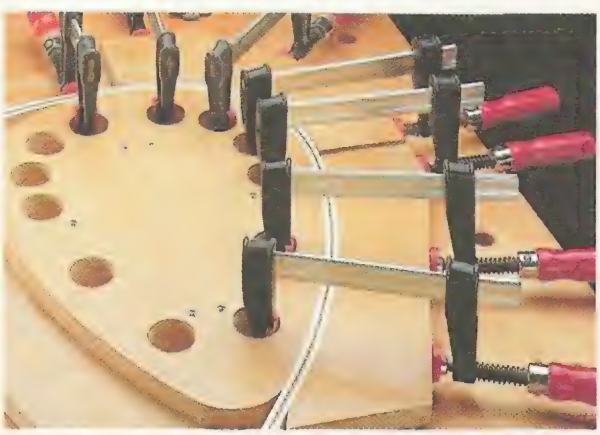
**GLUE-UP.** You're almost ready to glue up the strips. (I used polyurethane glue because it's waterproof.) But you'll need to have the handle ready as you're gluing up the strips.

**HANDLE.** The handle is made from a piece of 3/4"-thick hardwood (walnut), see drawing above. After using the handle template to lay out the basic shape, a counterbored shank hole is drilled down the length of the handle for a wrist strap that's added later. (I used a long brad point bit.) Then cut the handle to shape and sand the edges smooth.




## Gluing Up the Frame

1 *After centering the strips and temporarily clamping them to the jig, bend them around the inner form. Then clamp the first pressure block in place.*



2 *Now bend the strips a little more and add the next pressure block. To remove any gaps between the strips, you may need to reposition the blocks.*

3 *After repeating the process for the other side, carefully spread the strips apart and have a friend fit the handle (with glue on the edges) in place.*

4 *Adding the last two pressure blocks squeezes the strips tight against the handle. Once all the clamps are in place, allow the glue to dry overnight.*

*A simple way to close up a gap is to insert a wood shim between the strips and the pressure block.*

## Cleaning Up the Frame

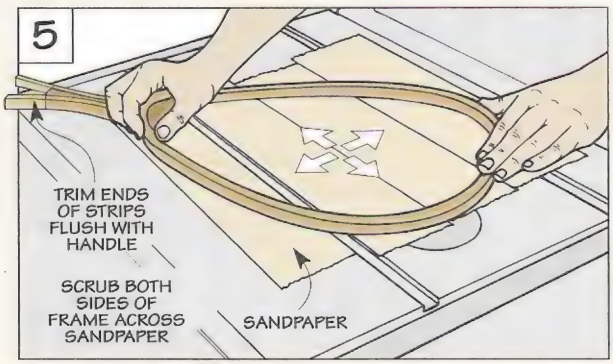
Don't be surprised when you remove the frame from the jig and it's caked with a thick crust of dried glue. All it needs is a little cleaning and shaping.

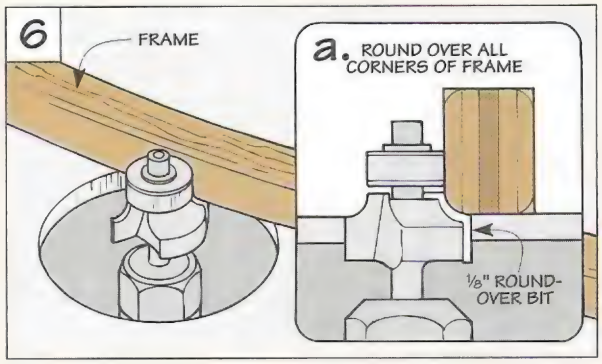
**TRIM WASTE.** But first, you'll want to remove the "tails" on the ends of the strips that extend past the handle, see Fig. 5. They're simply trimmed and sanded to match the curve on the bottom end of the handle.

**SCRAPE.** Now you can scrape off the bulk of the dried glue (I used a paint scraper). Just be careful that you don't bear down too hard and tear the wood fibers.

The rest of the glue can be removed by sanding the frame. An easy way to keep it flat is to put sandpaper on the top of the table saw and scrub the frame back and forth, see Fig. 5.

**ROUND EDGES.** Finally, to soften the sharp edges, I routed a roundover all the way around both sides of the frame, see Fig. 6.



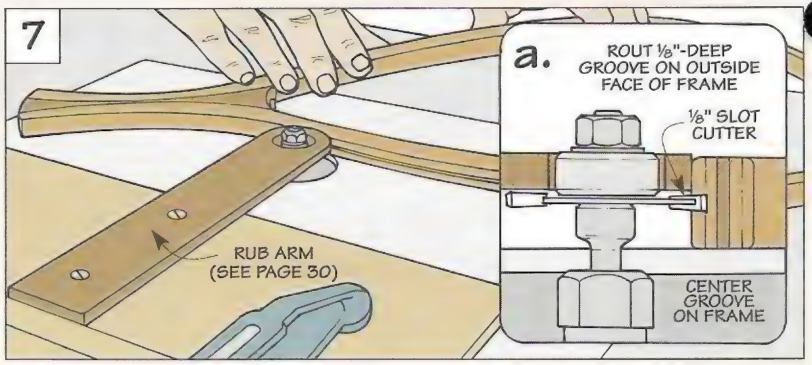

## The Net

▲ *With net in hand, it's just a matter of attaching it securely to the frame with braided mason's line.*

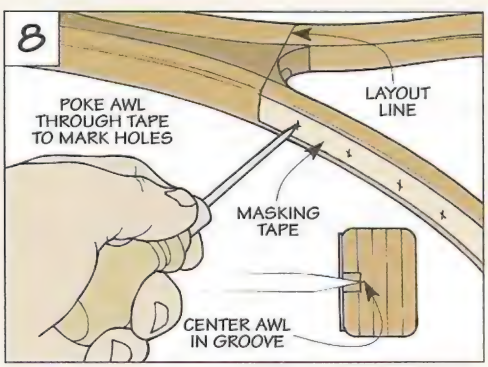
With the frame sanded smooth, you're ready to add the net. (I picked up a 14" replacement net at a local sporting goods store.)

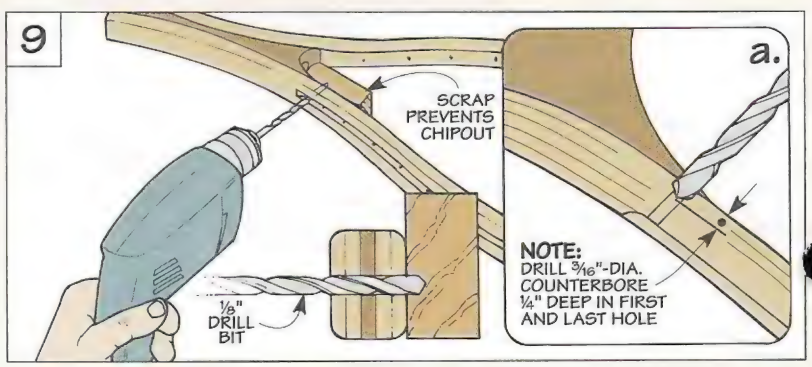
To attach the net to the frame, you'll need about six feet of mason's line. (You can get mason's line at most hardware stores.)

**GROOVE.** The mason's line fits in a groove that's routed on the outside of the frame, see Figs. 7 and 7a. This groove begins and ends at a line that's flush with the bottom of the curved "yoke" on the handle, see Fig. 8. To rout the groove I used a slot cutter and a simple rub arm, refer to page 30.



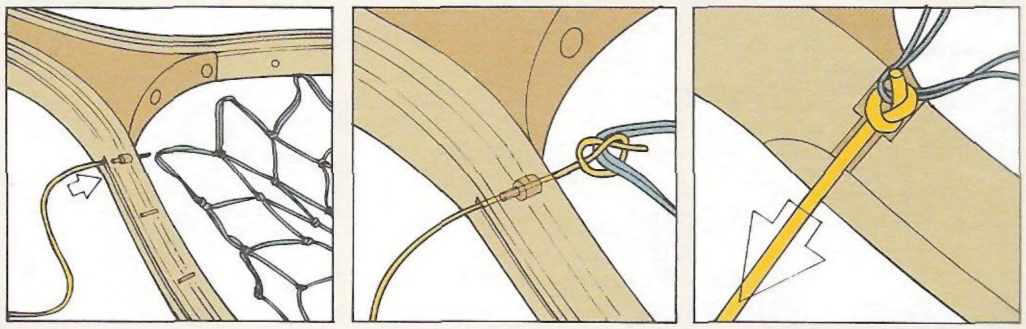

**DRILL HOLES.** Finally, drill a series of holes in the frame to secure the net, see Fig. 9. I used masking tape to lay out the holes, refer to page 30. Note: To create a recess for a knot in the mason's line, the first and last holes are counterbored, see Fig. 9a.



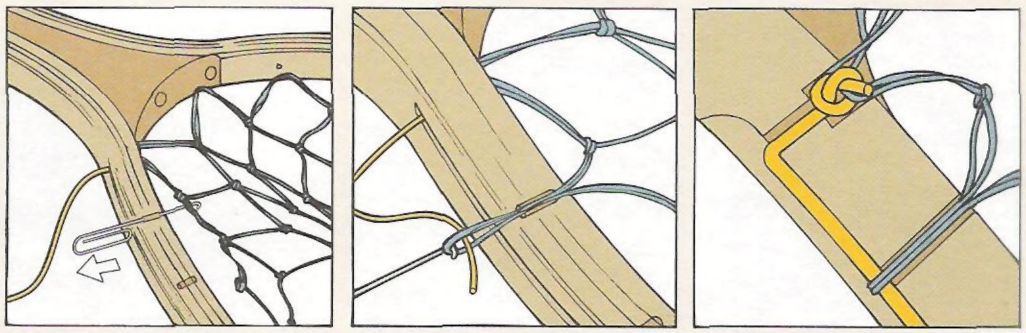



# Stringing the Net

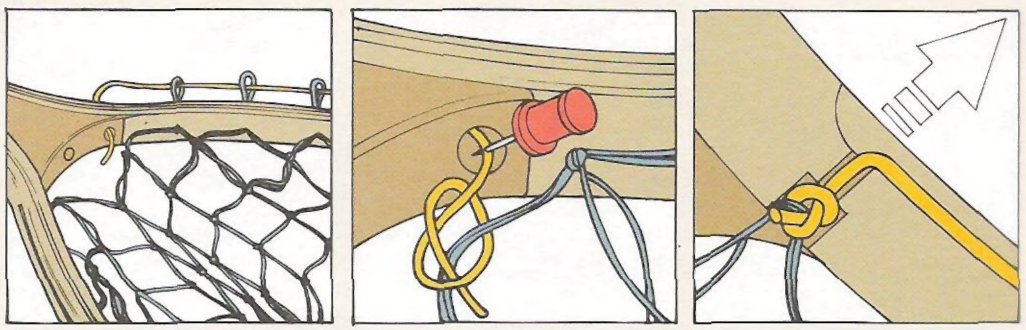
**1** *To string the net on the frame, start by passing one end of the mason's line through the first hole (see left-hand drawing). After tying it to one of the loops on the fishing net (center), pull on the mason's line to seat the knot in the counterbore (right).*



**2** *The next loop on the net is pulled through the hole in the frame with a paper clip (left). With the loop on the outside, you can weave the free end of the mason's line through the opening (center). Then simply pull the line and net tight (right).*



**3** *This process is repeated for all the loops except the last one (left). It's tied off as before. But first, pull the mason's line tight and pin it to the frame (center). This way, when you remove the pin, the tension draws the knot into the counterbore (right).*



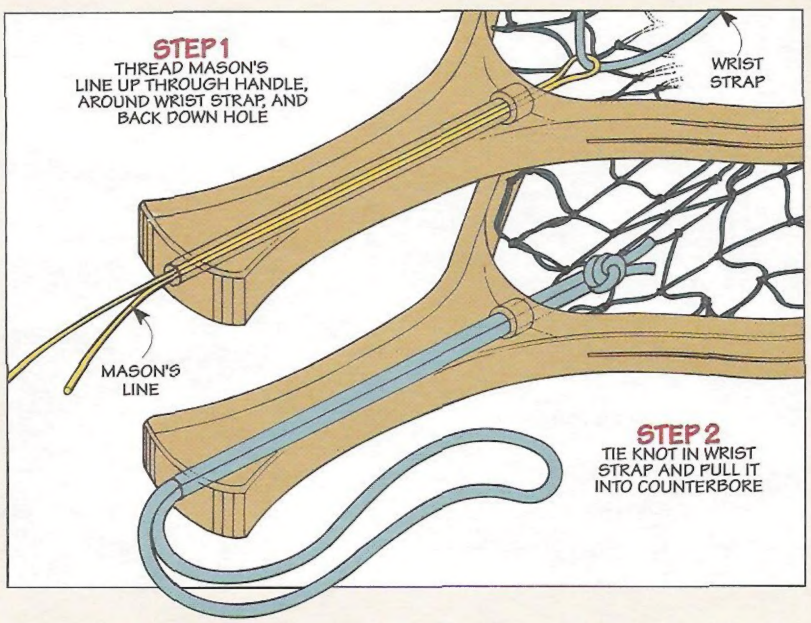
# Wrist Strap

To avoid dropping the net when landing "the big one," I attached a wrist strap to the handle.

The wrist strap is just a heavy-duty nylon lace for a hiking boot that passes through the hole drilled earlier in the handle.

An easy way to thread the wrist strap through the hole is to "fish" it through with a piece of mason's line, see drawing.

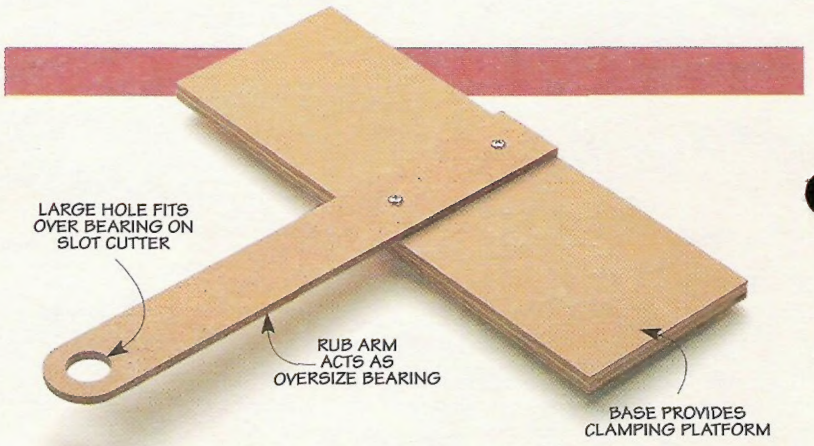
Start by feeding the line up through the hole, around the wrist strap, and back down the hole. After tying off the ends of the strap, tug on the line. This pulls the strap through and seats the knot in the counterbore.



# Shop Solutions

TIPS FROM OUR SHOP

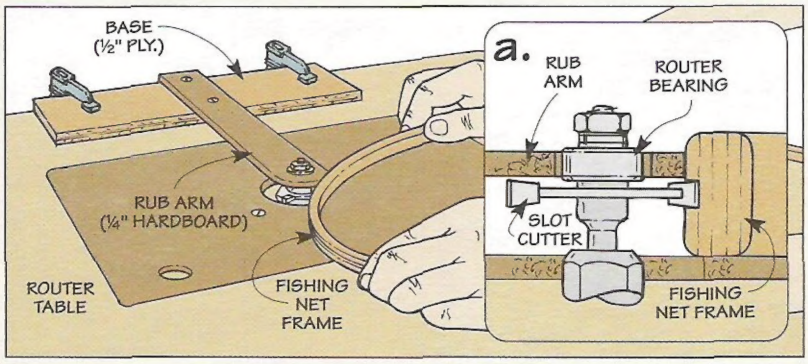
## RUB ARM




■ When building the frame for the fishing net, you'll need to rout a shallow groove for the string that holds the net in place. You can use a slot cutter in a table-mounted router to do this. But there's one small catch.

The bearing on most slot cutters is too small to cut a *shallow* (1/8"-deep) groove. Although you can replace the small bearing with a larger one, I used a little trick that doesn't require changing the bearing at all.

**RUB ARM.** The secret is a simple rub arm, see photo above. The rub arm has an oversized hole that fits over the bearing on the slot cutter. This means the workpiece rides against the rub arm — not the bearing, see drawing.




**DEPTH OF CUT.** What determines the depth of cut is how much the bit sticks out past the rub arm, see detail. (To rout the 1/8"-deep groove, the cutting edge of the bit protrudes 1/8".)

**HEIGHT.** Another consideration is the height of the rub block. This depends on the height of the plywood base that supports the rub arm. Ideally, the rub arm should contact the frame just above the bit.

**ROUT GROOVE.** After clamping the base to the router table, just slide the frame against the rub arm to rout the groove.

## "TAPE" MEASURE

■ How do you get perfectly even spacing between the holes in the frame of the fishing net? A handy way is to use a "tape" measure made of masking tape.

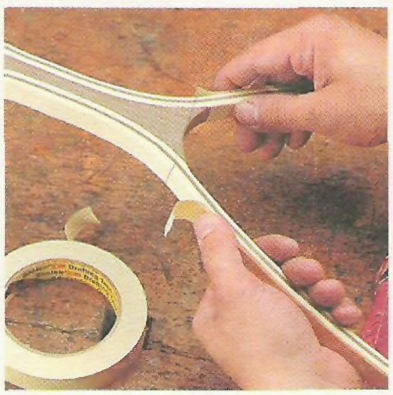
To determine the spacing between the holes, you need to know two things: the distance around the frame, and the number of loops in your fishing net.

**DISTANCE.** To find the distance around the frame, simply wrap the masking tape around it, see Step 1. Then peel off the tape, stick it on a flat surface, and measure its length.

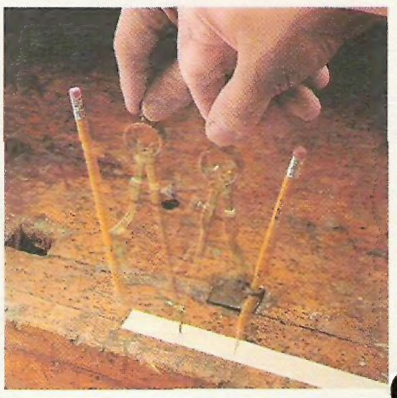
**LOOPS.** Now just count the number of loops on your net. (Our net had 34 loops.) This *is* the number of holes you'll need to drill in the frame.But it's *not* the number you'll be using to determine the spacing of the holes.

**SPACING.** That's because there will be one *less* space between the holes than the number of holes you drill. So what you want to do is divide the distance around the frame by the number of *spaces*. (In our case, this meant dividing 45 7/8" by 33 to find the spacing between the holes.)

**LAY OUT HOLES.** Once you've established the spacing, just set a compass to the same amount and use it to lay out the location of the holes on the tape, see Step 2.



1 *Wrap masking tape around the frame so the ends align with the layout mark on the handle.*



2 *Now just mark the location of each hole by "walking" a compass along the masking tape.*

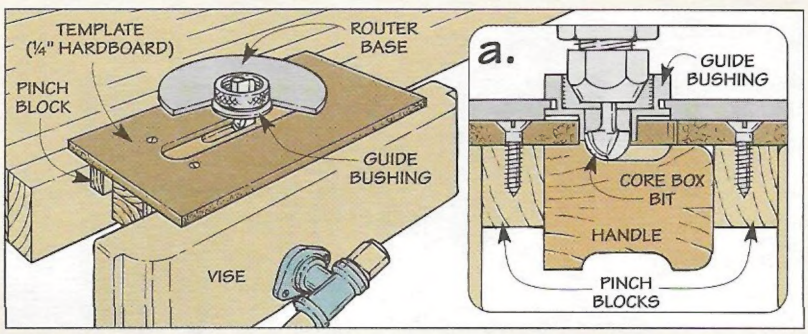
## ROUTING A FINGER RECESS

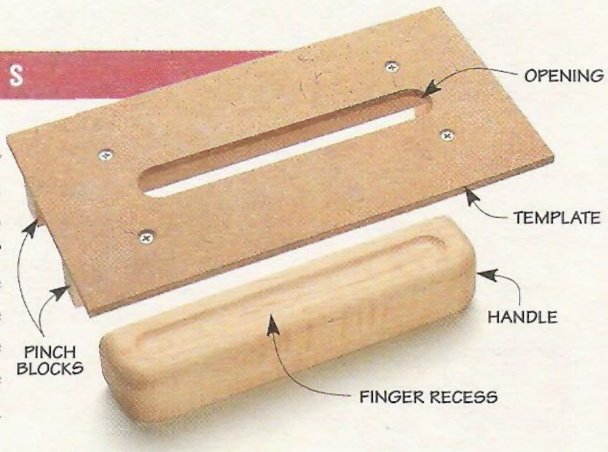
■ A hand-held router and a core box bit make quick work of cutting the wide finger recess in the handle of the flush trim jig (page 16). All you need to guide the bit is a guide bushing and a hardboard template, see margin and photo at right.

**TEMPLATE.** The template is just a piece of ¼" hardboard with an opening shaped like the recess. The thing to keep in mind is the opening is slightly *larger* than the desired size of the recess.

The reason for this is simple. When the guide bushing is attached to the base of your router, it rides against the edge of the opening. This means the bit won't cut right up next to the edge. So you have to compensate for this by making the opening in the template a bit larger.

To determine the size of the opening in the template, measure the distance from the outside edge of the core box bit to the outside edge of the bushing.




Then add that amount to the desired size of the finger recess.

**ROUT HANDLE.** After cutting the opening in the template, you're ready to rout the recess in the handle. What you want to do here is to center the opening in the template on the side of the handle.

An easy way to keep the template from shifting is to screw two wood pinch blocks to the bottom so they fit snug against the handle. Tightening these blocks in a vise pinches the handle and holds it in place while you rout the recess, see drawing and detail 'a.'

*Guide Bushing. With this guide bushing attached to the base of your router, you can use a simple template to rout the recess in the handle.*

## KERFING JIG

■ The two U-shaped sides of the serving tray shown on page 24 are joined by a spline that fits in a wide kerf cut in each end.

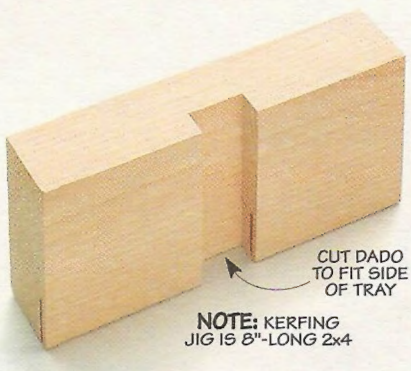
But trying to stand the sides on end when cutting this kerf is awkward. So I used a simple jig to hold the side securely in place.

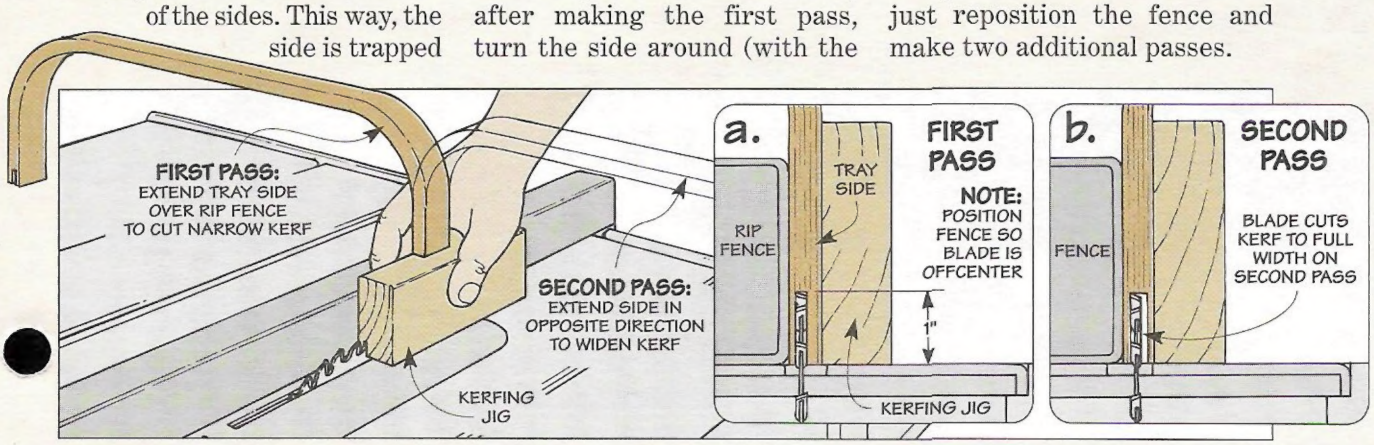
**JIG.** The jig is a scrap 2x4 with a dado that accepts the tray side, see photo. The width of this dado is sized so the side fits snug. And the depth matches the thickness of the sides. This way, the side is trapped securely against the fence as you cut the kerf.

**TWO PASSES.** To center the kerf on the end of each side, I cut it in two passes — one with the side extending over the rip fence, and the other with it turned the opposite direction, see drawing below.

To make this work, you'll need to lock the rip fence in place so the blade is slightly offcenter, see detail 'a.' Then, after making the first pass, turn the side around (with the same end in the jig) and make one final pass, see detail 'b.'

If you need to widen the kerf, just reposition the fence and make two additional passes.



# Scenes from the Shop

▲ *It's hard to imagine that the gently curved frame of this fishing net (above) was once hidden beneath a bending jig bristling with clamps and oozing with glue (inset). Made of cherry and maple, it's a real keeper.*

▲ *The metamorphosis of this serving tray is even more intriguing. The simple curve in the sides is formed in the glue-encrusted jig shown at right. And the handles are bent and twisted around a free-form jig, see front cover.*